Lower Joseph Creek Restoration Project

Botany Report and Biological Evaluation Including Special Habitats

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Date:

for:

Wallowa Mountain Ranger District
Wallowa-Whitman National Forest

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Introduction

This report will focus on:

- Threatened, Endangered and Sensitive (TES) plant species and habitat for suspected species present in the project or effects area
- Plants with cultural significance to Native American tribal members, in the project area.
- Proposed actions that may reduce viability, habitat, populations or individuals of TES plants within the project area
- Existing condition: identifying past and present (ongoing) actions or conditions that may reduce viability, habitat, populations or individuals with the project area.
- Cumulative Effects: identifying reasonably foreseeable actions, in addition to past, present and proposed actions that may reduce viability, habitat, populations or individuals with the project area

TES plants discussed in this report include all plant species designated by the U.S. Fish and Wildlife Service (USFWS) as federally listed, proposed, or candidate, and plant species designated as sensitive on the most recent Region 6 Regional Forester's Special Status Species List (USDA Forest Service, December 9, 2011). Rare plants in Oregon tend to fall into two primary groups of rarity-types, corresponding roughly to Oregon Biodiversity Information Center (ORBIC) lists 1 and 2. These are: plants with narrow geographic ranges, restricted habitats, and large or small populations, which are List 1 taxa, classic endemics; and taxa with wide ranges, restricted habitats, and large or small populations, primarily List 2 species (Kaye 1997). Many rare and endangered species that began as natural rarities have, through one form or another of human-induced detrimental changes in their populations and/or habitat, become anthropogenic rarities needing immediate protection and recovery (Feidler 2000). The sensitive plant list includes vascular plants, non-vascular plants (mosses and liverworts), lichens, and mushroom species. These species are collectively referred to as sensitive plants throughout this report.

Culturally significant plants are defined as those species which American Indian people use for food, medicine, basketry, dyes, house construction, and other purposes (Hann, 2010). Tribal treaties mandate that tribal members are allowed to sustainably gather traditionally used plants. Specific locations and names of species currently used by tribal members are not tracked by the Wallowa-Whitman National Forest. Therefore, analysis of potential impacts to these species is limited to general discussions. The assumption is that if soil is conserved, and ecological processes are allowed to continue, these species should be able to thrive and persist over time.

There were five “plant” references in the general comments gathered during scoping, three of which mentioned TES plants directly and two of which were concerned with the conservation of native plants in general. TES plant species are indirectly referenced in all three significant issues: road management, vegetation treatment, and treatment in MA15 and IRAs in the sense that all of the significant issues have resulting actions that have the potential to create disturbance that may reduce viability, habitat, populations or

individuals of TES plants, or increase viability and habitat in other instances, depending on the ecology of the species. TES plants are also indirectly referenced in other considerations of wildlife habitat, fire and fuels management, livestock grazing, watershed management, and aquatic habitat. Biodiversity will be discussed in the context of habitat and as part of restoration activities.

This analysis is limited to activities within the proposed action that may reduce viability, habitat, populations or individuals of TES plants. TES plants are not directly mentioned in the purpose and need for the Lower Joseph Restoration project. There is an indirect connection in the stated purpose of the project, "to protect natural resources at risk to uncharacteristic wildfires".

Appendices include:

Appendix 1: Sensitive Plant Occurrence and Effects Calls includes a complete list of sensitive plant species for the Wallowa-Whitman National Forest. It also includes the biological evaluation effect calls for each species for each alternative.

Appendix 2: Blue Mountain Plant Habitat Groups and Associated Sensitive Plant Species outlines which sensitive plant species may occur in various broad plant habitats.

Appendix 3: Plant communities of concern listed in HCNRA CMP

Appendix 4: Botany Related Project Design Criteria includes botany-related design criteria that are included in the action alternatives.

Appendix 5: A. Map of TES plant locations; B. Map of Biologically Unique and Rare Combinations of Outstanding and Diverse Ecosystems

Regulatory Framework

This report provides documentation of the biological evaluation process used for plants for this project. It also includes documentation and analysis related to the Federal Endangered Species Act in regards to plants.

The biological evaluation (BE) process as outlined in the Forest Service manual (Section 2672.4) states:

"The Forest Service shall review all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened, proposed, or sensitive species. The biological evaluation is the means of conducting the review and of documenting the findings. Document the findings of the biological evaluation in the decision notice. Where decision notices are not prepared, document the findings in Forest Service files. The biological evaluation may be used or modified to satisfy consultation requirements for a biological assessment of construction projects requiring an environmental impact statement."

The objectives of the Biological Evaluation process are:

1. To ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant, or contribute to a trend towards Federal listing of any species.
2. To comply with the portion of the Endangered Species Act that requires that actions of Federal agencies not jeopardize or adversely modify critical habitat of federally listed species.
3. To provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process.

Land and Resource Management Plan

The Wallowa-Whitman National Forest Land and Resource Management Plan (LRMP) provides standards and guidelines for maintaining diversity, sensitive species.

Diversity
WWNF LRMP 4-30
Standards and Guidelines

- Project Analysis: Develop, during project planning, site-specific management prescriptions with goals for diversity and ecosystem function.
- Vegetation Manipulation: Provide and maintain an ecologically sound distribution and abundance of plant and animal communities and species at the forest stand, basin, and Forest level. This distribution should contribute to the goal of maintaining all native and desirable introduced species and communities
- Allow for all natural species to function following vegetation manipulation. None should be eliminated from the site.
- MA 3, 3A: Timber/Wildlife emphasis: Fire Favor prescribed fire slash treatment methods when feasible prescribed fire from planned or unplanned ignitions will be used to achieve winter range management objectives, and maintain diversity within plant communities

Threatened, Endangered and Sensitive Species
WWNF LRMP 4-30 to 4-31
Standards and Guidelines

- Review all actions and programs, authorized, funded, or carried out by the Forest Service, to determine their potential effects on threatened, endangered, and sensitive species. Conduct these reviews, including biological evaluations, per direction in FSM 2670 and appropriate R-6 manual supplements.
- Prepare a biological evaluation during the environmental analysis of each project to determine possible effects of the proposed activity on threatened, endangered, and sensitive species.
- Restrict or prohibit other activities (e g , off road vehicles impacting plants or habitats) and monitor activities where necessary to protect threatened, endangered, or sensitive species.

- Cooperate with the US Fish and Wildlife Service, the States of Oregon, Washington, and Idaho in the development and implementation of recovery plans for threatened and endangered species. When such plans conflict with other management direction, the recovery plans will take precedence.
- Monitoring: Monitor known populations of sensitive species and their habitats in accordance with the Forest Monitoring Plan.

Pertinent Standards and Guides from HCNRA CMP

Rare and Endemic Plant Species

Bio-S1: During project-level planning, to the extent feasible, survey and document the location of populations of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats. Consider the effects of proposed projects on populations of rare and endemic plant species, are combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats. Prescribe mitigation and protection for populations of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats.
Refer to Appendix G – Detailed Vegetative Data for the criteria and a listing of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats. (New)
TES-O1: Manage habitat and populations of federally listed threatened, endangered or proposed plant species to ensure their continued existence and recovery in the HCNRA. Ensure that ongoing and new management actions do not jeopardize federally listed threatened, endangered or proposed plant species. Implement restoration and recovery activities that would facilitate removal of species from the federal threatened and endangered species list. (Forest Plan, FSM 2670)
TES-O2: Manage habitat and populations of all FS sensitive plant species to ensure their continued existence and viability in the HCNRA. Ensure that all actions do not contribute to the species becoming federally listed threatened and endangered under the *ESA*. (Forest Plan, FSM 2670)
TES-O3: Implement recovery plans for federally listed threatened, endangered or proposed plant species cooperatively with the USFWS. Contribute to revisions of recovery plans, and carry out recommended actions in recovery plans. (Forest Plan, FSM 2670)
TES-S1: When evaluating ongoing and new actions, survey probable habitat for rare plants. Mitigate potential conflicts or modify the project to ensure the protection of rare plants and their associated habitat. (Forest Plan, FSM 2670)
TES-O4: Conduct habitat improvement projects for federally listed species. These may include fencing, burning, closing roads, treatment of noxious weeds, plant propagation, or other actions. (New)
TES-S2: Monitor population trends and habitat conditions for federally listed threatened, endangered or proposed plant species. (Forest Plan)

TES-S3: Manage habitat and populations of FS sensitive species consistent with conservation agreements or conservation strategies. (New)
In the absence of conservation agreements or strategies, manage sensitive plant species to ensure their continued viability in the
planning area. (Forest Plan, FSM 2670)
TES-G1: To achieve recovery plan goals, consider reintroduction of federally listed species, in suitable, currently unoccupied habitat. (New)
TES-G2: Consider modifications to activities such as seasonal or permanent closures for roads, trails, exclusion of domestic livestock grazing, and modification of grazing plans where conflicts with the protection of rare plant species are identified. (Forest Plan)
Fire-S6: Construct firelines to avoid any known federally listed threatened and endangered or proposed plant species or potential habitat, unless coordinated with a Resource Advisor and suitable alternative locations and actions are not possible. (New)

Biologically Unique and Rare Combinations of Outstanding and Diverse Ecosystems

BUC-O1: Maintain biologically unique and rare combinations of outstanding and diverse ecosystems and parts associated therewith in an ecologically functioning sustainable condition. (New)
BUC-S1: Document and map biologically unique and rare combinations of outstanding and diverse ecosystems and parts associated therewith when they are encountered during site-specific activities such as range analysis, rare plant surveys, and vegetation examinations. (New)
BUC-G1: Consider selecting biologically unique and rare combinations of outstanding and diverse ecosystems and parts associated therewith as key utilization areas in range analysis where applicable and appropriate. (New)
BUC-O2: Outside Wilderness, maintain rare combinations of outstanding and diverse ecosystems and parts associated therewith or manage to attain the PNC within the HRV. (New)

Management Areas

MA1 Timber, MA3 Big Game Habitat, MA 7 Wild and Scenic River (Joseph Creek), MA 9 HCNRA Dispersed Recreation, MA 10 HCNRA Forage, MA 11 HCNRA Dispersed Recreation and Timber, MA 12 Research Natural Areas (Horse Pasture Ridge, Haystack Rock), and MA 15 Old Growth Forest

Federal Law

Endangered Species Act
Critical Habitat Unit
National Forest Management Act

Executive Orders

Invasive Species, EO 13112 of February 3, 1999
Protection of Wetlands EO 11990 of May 24, 1977
Environmental Justice, EO 12898 of February 11, 1994

State and Local Law

ORS 2013 564.105 Responsibility to protect and conserve native plants

Other Guidance or Recommendations

Viability USDA regulation 9500-004 2008
Forest Service Manual 2600 and 2670 TES Plants
Species Diversity 1982 Planning Rule Section 291.27(g)
The Interior Columbia Basin Strategy
USFWS 2007 Recovery Plan for Silene spaldingii (Spalding's Catchfly)

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

All activities proposed under any action alternative comply with Forest Plan and other relevant laws, regulations, policies, and plans. The biological evaluation process and the interdisciplinary team process ensure that Federally listed, proposed, candidate, and Forest Service Sensitive plant viability are considered for all actions undertaken by the agency. The BE process was conducted by a professional botanist. For details of the specific compliance with laws, regulations, policies, and plans see the relevant section of the botany specialist report.

Affected Environment

Project Area

The Lower Joseph Creek project area lies adjacent and east of Oregon State Highway 3 on the northern boundary of the Wallowa-Whitman National Forest (WAWNF), approximately 20 miles north of Enterprise in Wallowa County. The project encompasses approximately 98,000 acres and is bounded by Cold Springs Ridge to the northeast, Forest Road 46 to the east, and Elk Mountain to the south. It contains the upper reaches of the Joseph Creek drainage, including the watersheds of Lower and Upper Swamp Creek, Peavine Creek, Rush Creek, Davis Creek, Sumac Creek, Lower and Upper Cottonwood Creeks, Broady Creek, Horse Creek, Cougar Creek, and Green Gulch. The

The area is characterized by deep canyons with very steep, grass-covered side slopes interspersed with numerous exposed rock (basalt) layers. Vegetation is composed of cool moist and warm dry grasslands, warm dry shrublands, dry mixed conifer forest and moist mixed conifer forest. Elevations range from about 3600 to 5000 feet.

Project Summary

LJCRP is primarily a set of silvicultural prescriptions combined with prescribed fire intended to move forested systems within the project area towards a more fire resilient structure and composition. The following activities from the proposed action will be included in this analysis because they are likely to create disturbance that may reduce viability, habitat, populations or individuals of TES plants:

- Thinning, and mechanical fuel treatments across approximately 20,000 acres
- Thinning of largely younger trees across an additional 5,000 acres
- Prescribed burning of hazardous fuels, where ecologically appropriate, on up to 90,000 acres
- Riparian and flood plain restoration which may include road closure or modification, channel reconstruction, fencing, planting, conifer removal, in-stream structure placement, and bank stabilization.
- Approximately 1.5 miles of new system road will be constructed; 24 miles of system road will be reconstructed; and 26 miles of new temporary roads will be constructed.
- Connected actions included in the analysis are: road maintenance, and hazard tree cutting or removal. Fuels associated with silvicultural treatments (activity fuels) will treated with a suite of available tools including, but not limited to, mastication, removal, pile and burn, cutting and scattering limbs, and prescribed fire.

Methodology

Prefield Review: Existing Populations and Surveys for Sensitive Plant Species

A pre-field review was conducted to determine the probability that sensitive plant populations, and potential sensitive plant habitat, are located within, or adjacent to, the project planning area. This information was used to determine the need for, and intensity of, botanical surveys.

The following sources of information were used to determine which species, and their respective habitats, may occur within, or adjacent to, the project planning area:

- USFS Region 6 Sensitive Species List (USDA Forest Service; 2011)
- Interagency Special Status / Sensitive Species Program website.
- GIS mapping layers (vegetation, streams and wetlands, aerial imagery)
- Project GIS layers showing potential activity units
- “Field Guide to Sensitive Plants of the Wallowa-Whitman National Forest” (USDA Forest Service, unpublished document, 2014
- United States Department of Interior Fish and Wildlife Service (USDI-FWS) website.
- USFS Natural Resource Manager TES Plant tabular and spatial data USFS 2014.
- Lower Joseph Range Analysis, WMO, 2005
- Lower Joseph Watershed Analysis, WMO 2010

- Recovery Plan for Silene spaldingii (Spalding's Catchfly), USFWS 2007
- Project Files for The Blue Mountain LRMP, Brooks 2007
- USDA NRCS Plants Database (website)
- 2007-2013 Consortium of Pacific Northwest Herbaria (website)
- Oregon Biodiversity Information Center

Botanical surveys for this project were conducted according to standard Forest Service procedures, using the intuitive controlled method. This means that large areas were surveyed, focusing on searching habitats for TES species determined from the pre-field review (USDA Forest Service 2008). At the time of the surveys, individual activity units, and proposed riparian restoration, and road work were only broadly delineated, so surveys were not done in all proposed vegetation management units, nor were all specific road work areas surveyed. Selected high probability areas with potential for ground disturbance would be surveyed before project implementation. If any sensitive plants are found, mitigations for protection would be developed.

Habitat Groups

Sensitive plants tend to grow in specialized habitat types within broader plant communities. For example, some species are found in moist swales and depressions within general sagebrush habitat. Others occur in the transition zones between habitat types. Since there are so many potential sensitive plant species in the LJCRP area, it is more efficient to talk about the broad habitat types, rather than each individual species. For this analysis, plant communities and special habitats have been grouped into broad habitat association groups. Culturally significant plants can also be grouped based upon these same broad habitat types.

Potential vegetation groups discussed here are described in "Potential Vegetation Hierarchy for the Blue Mountains Section of Northeastern Oregon, Southeastern Washington, and West-Central Idaho" (Powell et al, 2007). According to that reference, "Potential vegetation is defined as the community of plants that would become established if all successional sequences were completed without interference by humans, under existing environmental conditions including edaphic, topographic, and climatic factors. Potential vegetation is used to characterize biophysical settings, and their associated potential natural communities. Potential vegetation groups are named for a predominant or controlling temperature or moisture relationship." Only the more prevalent potential vegetation groups are included in the following discussion. They will be used to characterize habitat groups for the sensitive and culturally significant plant species that may be found on the Wallowa-Whitman National Forest.

Key Effects Indicators

To help define current condition for TES plants, quality of habitat, diversity, and viability for TES species were considered using the following methods. The same methods were used to help assess effects for the action alternatives.

Habitat

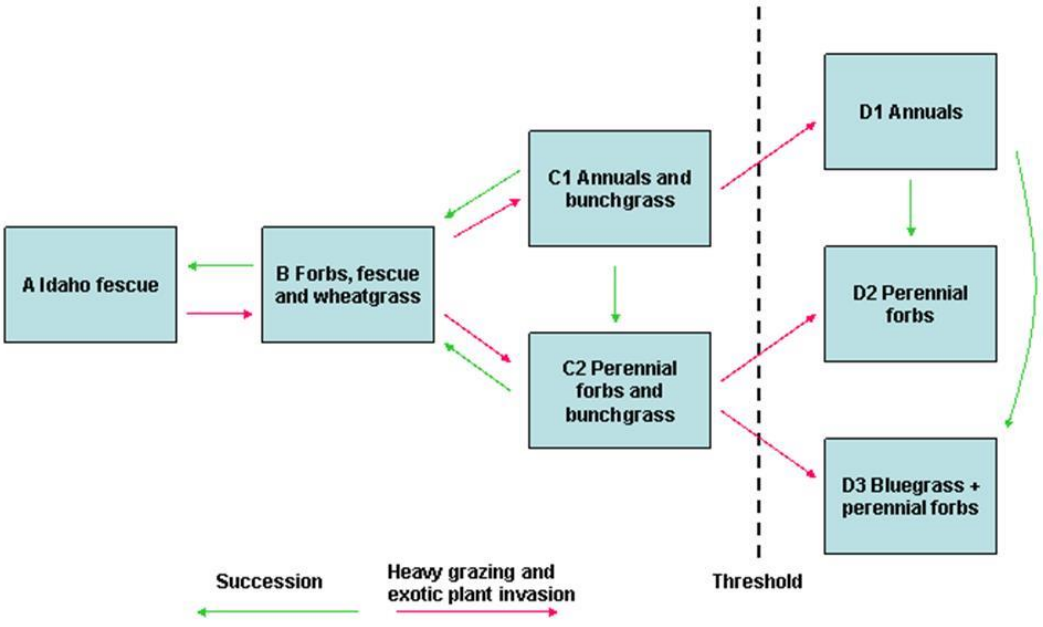
Overall quality of habitat on a landscape scale using percent departure from historic range of variability (HRV) by Potential Vegetation Groups (PVG) is given for coniferous forest in the silviculturist's report. HRV for grasslands is best described using the state

and transition concept. According to the state and transition model, vegetation at a given site is determined by a complex set of interactions of past management, natural disturbances, climate, and seed sources and are described as a phase A through D. Percent of each phase by habitat within LJCRP area informs departure from HRV for non-forested systems in the project area.

The phases are defined as follows:

- **A** Vegetation is relatively pristine, close to the potential natural vegetation
- **B** Vegetation has been moderately altered by grazing to the point that grazing sensitive species (decreasers) are diminished but still present
- **C** Vegetation has been greatly altered by grazing but still retains enough native species to be able to recover to PNV
- **D** Vegetation has been altered by loss of native species and invasion of non-native species. This phase has crossed a transition to a new state, meaning return to PNV by natural succession is probably not possible (Johnson 2005).

Figure 1. Example of a State and Transition Model: Idaho fescue-Prairie Junegrass (Ridge) Plant Association and degenerated bench plant community type (Ecology Website version 2008).



Diversity

"Forest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices." (36 CFR 219.26)

Diversity is given in this document as total number of vascular plant species, as a ratio of native to non-native plants, and using the Shannon diversity index as an indicator of variability. The Shannon diversity index indicates where there is more variation in a community's composition, the less predictable each sample of it would be. Values range from 0 for a community with one species to values up to 7 for communities with many species, The higher the number, the less predictable the sample (Barbour 1987). The following equation expresses the Shannon Diversity Index:

$$H' = -\sum_{i=1}^{s}(p_i)(lnp_i)$$

Where H′ is the index number, s is the total number of species in the sample and p_i is the proportion of all individuals in the sample that belong to species *i*.

Plants were categorized using information from NRCS Plants database and the Blue Mountain Ecology database. Ecology plots established to describe plant communities and associations provided species lists for each habitat type. Ecology plots were established to be representative of vegetation types in good condition, and while the data from ecology plots cannot be directly extrapolated to the project area, they provide useful information on the potential vegetation types they represent.

Viability

"For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." (36 CFR 219.19)

Species included on the R6 Regional Forester's TES list have viability concerns. In addition to the R6 determination of viability at risk, Oregon Biodiversity Information Center (ORBIC), a state funded entity that provides information on Rare Plants and Animals in Oregon, provides more detail about the type of rarity/viability risk for each species. ORBIC uses a 1-5 scaled ranking, based primarily on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. Global (G) and State (S) are included. The ranks are summarized below:

1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.
3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences.
4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.
5 = Demonstrably widespread, abundant, and secure.

H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered (ORBIC 2012).

Existing Condition

Known Threatened, Endangered, Proposed, R6 Sensitive and Strategic Plants

Threatened and Endangered Plants

A review of the list prepared for Wallowa County shows that there are two federally listed threatened plant species with potential habitat in the LJCRP. Sensitive species are discussed by habitats following the information on McFarlane's four-o'clock **(*Mirabilis macfarlanei*)** and Spalding's catchfly **(*Silene spaldingii*)**. Botanical surveys were conducted during the 2014 field season, covering over 20,000 acres. McFarlane's four o'clock is not suspected from the LJCRP due to previous work in the project area. While suitable habitat for Spalding's catchfly exists in the project area, no occupied sites were found within LJCRP and as a result LJCRP is not likely to adversely affect Spalding's catchfly. Habitat analysis for Spalding's catchfly is included with the R6 Sensitive species found in grasslands since there is potential habitat for this species.

MacFarlane's four-o'clock – MacFarlane's four-o'clock is listed as Threatened under the Federal Endangered Species Act (ESA) (USFWS 1996).

MacFarlane's four-o'clock is a perennial plant with a deep-seated, thick tap-root and spectacular bright magenta flowers. On the WWNF, MacFarlane's four-o'clock grows in canyon grassland habitats between 1,000 and 3,200 feet in elevation in the Imnaha and Snake River drainages of Oregon and Idaho. The total geographic range of the species is approximately 29 by 18 miles. MacFarlane's four-o'clock habitat is characterized by regionally warm and dry conditions, with less than 12 inches of precipitation, primarily rain during winter and spring. Populations have been found in many different non-forest plant associations, soil types, and on all aspects and slope angles. Its habitat is generally described as canyon bluebunch wheatgrass grasslands, though some patches are found adjacent to low elevation sumac, hackberry and mountain mahogany. Soil surveys have not been conducted in or near occupied habitat, but MacFarlane's four-o-clock occurs on several soil types.

There are no known populations of this species in the LJCRP, although the Joseph Canyon system contains plant associations and other environmental elements, including elevation, that are consistent with environmental attributes of known MacFarlane's four-o-clock sites elsewhere across its range. A few surveys have been conducted in Joseph Canyon for this species. In 2001 the WWNF completed a cooperative project with the Oregon Biodiversity Information Center (ORBIC) to model potential habitat (Murray 2001) for MacFarlane's four-o-clock for use in the development the Hells Canyon National Recreation Area Comprehensive Management Plan. This model was subsequently used in 2003 to help identify potential habitat within the planning area of

the Joseph Creek Rangeland Analysis project. Professional judgment, aerial imagery, and model results were used to identify and prioritize areas for survey work and analysis. Approximately 400 acres of potential habitat were selected for survey work in Joseph Canyon during the 2003 and 2004 field seasons. These areas were surveyed by Forest service personnel and contracted botanists. No MacFarlane's Four-O-Clock was located during these surveys. Additional TES plant surveys were conducted in 2014 in preparation for LJCRP. Upon review of field observations gathered during surveys it was concluded that it was very unlikely that any MacFarlane's four-o-clock would be found in the area of Joseph Canyon that was administered by the Forest Service. It was concluded that better potential habitat exists further down canyon closer to the Snake River where Joseph Canyon is warmer and wider (Hustafa, pers.comm.)

Spalding's catchfly (*Silene spaldingii*) – Spalding's catchfly is listed as Threatened under the ESA.

Spalding's catchfly (*Silene spaldingii*) is a long-lived perennial in the carnation or pink family. The plant's long taproot makes transplanting the species difficult at best, and perhaps impossible. The plant blooms from mid-July through August, but it can bloom into September. The plant may remain dormant for 3 (and up to 6) consecutive years without emerging above ground. The species, listed as threatened in 2001, is native to portions of Idaho, Montana, Oregon, Washington, and British Columbia, Canada, and is found predominantly in bunchgrass grasslands and sagebrush-steppe habitats, and occasionally in open pine habitats. Occupied habitat includes five physiographic (physical geographic) regions: the Palouse Grasslands in west-central Idaho and southeastern Washington; the Channeled Scablands in eastern Washington; the Blue Mountain Basins in northeastern Oregon; the Canyon Grasslands of the Snake River and its tributaries in Idaho, Oregon, and Washington; and the intermountain valleys of northwestern Montana. A final recovery plan for this plant was released October 15, 2007. The goal of the recovery plan for Spalding's catchfly is to recover the plant by protecting and maintaining reproducing, self-sustaining populations so that protection under the Endangered Species Act is no longer necessary. States in which *Silene spaldingii* is known to occur are Idaho, Montana, Oregon and Washington (British Columbia in Canada).

Spalding's catchfly is found in several widely scattered populations in Wallowa County. The largest occurrences are found on TNC land on the Zumwalt prairie and Clear lake ridge. On the WWNF, this species is typically found in grasslands dominated by Idaho fescue (*Festuca idahoensis*). On the Wallowa Valley Ranger district Spalding's catchfly is found in habitat typically classified as Idaho fescue – prairie junegrass ridgetop plant associations (Murray 2001). Several populations of this species are found in this habitat in the Crow creek and Romaine gulch vicinities adjacent to the southeast portion of the LJCRP. In the Hells Canyon National Recreation Area, Spalding's catchfly is found in habitat typically classified as Idaho fescue – prairie junegrass low elevation plant associations (Murray 2001). It is likely that it would also be found on other variations of fescue habitats found in the canyon. Spalding's catchfly is recorded in this habitat in the lower Imnaha canyon and in the Joseph canyon north of the National Forest boundary.

Surveys specifically targeting this species on National Forest land have occurred on a limited basis related to project specific planning efforts. Two inventory projects specifically targeting this species have been funded and conducted in the LJCRP by the USFWS and the Forest Service. Two other similar inventory projects specifically targeting this species have been conducted in the Upper Joseph Canyon Watershed. In 2001 the WWNF completed a cooperative project with the Oregon Biodiversity Information Center (ORBIC) to model potential habitat for Spalding' catchfly for use in the development the Hells Canyon National Recreation Area Comprehensive Management Plan (Murray 2001). This model was subsequently used in 2003 to help identify potential habitat within the planning area of the Joseph Creek Rangeland Analysis project. Professional judgment, aerial imagery, and model results were used to identify and prioritize areas for potential survey work and analysis, as part of the rangeland analysis effort. Similar tools were used to identify additional acres of potential habitat in both the LJCRP and in parts of Hells Canyon National Recreation Area. The model has been helpful in determining unlikely habitat for Spalding's catchfly, but not as effective in locating populations (Hustafa, pers. comm.). Approximately 26,000 acres of potential Spalding's catchfly habitat are modeled within the Forest Service lands in the Lower Joseph Creek watershed. The attached map displays areas were surveys have been conducted for this species within the LJCRP between 2003 and 2014. LJCRP will be analyzed for effects to Spalding's catchfly habitat, although no plants have been found to date.

Documented and Suspected R6 Sensitive, Strategic and Culturally Significant Plants by Habitat

Each sensitive plant species has been assigned to one of each of the described habitat groups, however some of the species can be found in more than one habitat group. For species found in more than one habitat group, other habitat groups are noted in the text associated with that species, as well as in Appendix 2 Habitat Groups and Associated Species. It is assumed for the effects analysis that all plants growing in a particular habitat will have similar responses to restoration activities. Potential project impacts will be discussed in regards to the habitat type affected. Many strategic species are poorly known (i.e., distribution, habitat, threats, or taxonomy), so conservation status is unclear. Management direction for strategic species requires field units to record survey and location information in the agency's corporate Natural Resource Information System (NRIS) databases (NRIS TES Plants for vascular plants, non-vascular plants and fungi. Strategic Species are **not** considered "sensitive" under Forest Service Manual (FSM) 2670 and do not need to be addressed in Biological Evaluations. Strategic species are included as a way to further inform the habitat descriptions and analysis of effects to habitats with TES plant species. HCNRA Rare Combinations of Outstanding and Diverse Ecosystems documented from LJCRP, and other plant communities of concern (Pacific yew and Aspen) are also included in the interest of maintaining biodiversity.

Coniferous Forest (Dry upland forest and moist upland forest PVGs)

The conifer forest habitat group includes all types of forest found in LJCRP, from dry ponderosa pine forest to the moist grand-fir, although most of the TES species listed below are found in mesic/moist conifer habitat. Warm dry forests can have ponderosa pine, Douglas-fir, or grand fir as their climax species. The understory is often dominated by low shrubs such as snowberry and birch-leaf spiraea. The main grasses and sedges found here are pinegrass and elk sedge. These forest communities are common throughout the Blue Mountains, including LJCRP. These plant communities are the areas that were historically heavily logged. Most of the large old ponderosa pine and Douglas fir have been removed. Fire exclusion has facilitated the growth of relatively thick stands of younger trees in many areas. Much of this habitat type is now in uniform plantations of young trees. There are relatively few sensitive plant species that are suspected to occur in these areas. Most of them that may be found are those that rely on deep organic duff, or slightly moister sites within the broader area.

Moist upland forest types include warm moist, cool moist, to cool wet plant associations. The dominant climax species of trees in these areas range from Doug-fir in warmer sites, to grand fir in moist areas, to lodgepole pine in higher elevation or cooler areas. Shrubs in these areas include Rocky mountain maple, Pacific yew, and big huckleberry. Moist site indicator herbs include twin-flower, queens' cup bead-lily, and heartleaf arnica. Several understory species in these forest types are culturally significant plants. They are collected for foods and herbal medicines. Morel mushrooms are also commonly found in these forest types. Although some morels are found in undisturbed areas, they often fruit more abundantly after disturbance due to animals, logging, or fire. This habitat type has been heavily altered due to timber harvest and fire suppression.

Cordilleran sedge (*Carex cordillariana*) and clustered lady's slipper (*Cypripedium fasciculatum*) are found in both moist and dry forests, though both plants need some shade, if not tree canopy, then shrub canopy. Northern twayblade (*Listera borealis*) is found in forested areas with high soil moisture such as mossy areas, forested swampy areas and along forested cold streams. Both the clustered lady's slipper and northern twayblade are in the orchid family and require some sort of mycorrhizal symbiont. Mycorrhizae are the underground portion of a group of mushrooms that grow on the roots of plants, taking nutrients from the host plant or tree in return for more efficient nutrient and water absorption by the plant or tree host. The truffles, *Rhizopogon subclavitisporus* and *R. bascillisporus* (strategic species) have scant habitat information and are assumed to be found in both dry and moist conifer forests. Truffles are mycorrhizal fungi whose fruiting bodies stay below the soil surface. The strategic species, Bug on a stick (*Buxbaumia aphylla*) is found an a variety of substrates such as wood or soil in both open and closed canopy forests, though associated tree species (Doug-fir, western hemlock, and lodgepole suggest moist to cold forests. Moist forests are the habitat of naugehyde liverwort (*Ptilidium pulcherrimum*), and in LJCRP it would be expected in the most mesic forested habitats, likely on the lower boles and bases of trees. Goblin's gold (*Schistostega pennata*) and bent stem moss (*Tetraphis geniculata*) both inhabit closed canopy, low light areas.

Within this habitat type HCNRA Rare Combinations of Outstanding and Diverse Ecosystems ***Ponderosa Pine/Idaho Fescue and Ponderosa Pine/Bluebunch***

Wheatgrass plant associations are included because there are documented sites within LJCRP. Ponderosa pine totally dominates as the only tree species able to persist in the PIPO/FEID type. Shrubs are essentially absent, but common snowberry and rose do occur in limited amounts. Idaho fescue (FEID), bluebunch wheatgrass (AGSP), and prairie junegrass (KOCR), are the dominant understory species in the type. The most common forbs are lupine (LUPIN), and yarrow (ACMIL). The PIPO/AGSP community is very dry with trees occurring in a savannah over bluebunch wheatgrass-dominated steppe. Ponderosa pine totally dominates as the only tree species able to persist in the PIPO/AGSP type.

Shrubs are absent except for occasional dry-site opportunists (serviceberry, mountain-mahogany, squaw currant). Bluebunch wheatgrass and pine bluegrass (POSC) dominate the understory with cheatgrass usually associated in areas where ungulates have churned the soil beneath the old-growth trees. Idaho fescue is absent as it is unable to persist on these drier sites. Yarrow and lupines are the only common forbs regularly associated. Both of these plant associations are uncommon in the HCNRA. Most of the ponderosa pine-dominated communities are successional to Douglas fir. The Little Granite RNA was proposed in part to encompass known locations of these associations. Although ponderosa pine/bunchgrass communities with Idaho fescue and bluebunch wheatgrass potentials are found throughout the inland Pacific Northwest, sites which are too warm and too dry for fir establishment are limited in the HCNRA.

Grand Fir/Pacific yew/queen's cup beadlily plant association is not listed as an HCNRA Rare Combinations of Outstanding and Diverse Ecosystems, but it is only occasionally found in the Wallowa Snake Province (Johnson & Simon 1987), where LJCRP lies. Locally, this habitat is of concern due to past silvicultural practices where yew was considered to have no value and was removed with the goal of converting ABGR/TABR/CLUN sites to more commercially viable tree species. Yew occurs as a member of forested riparian habitats in grand fir and Engelmann spruce dominated old growth and near seeps and springs as inclusions in ABGR/LIBO2 and ABGR/VAME communities. Pacific yew communities indicate a high water table (Johnson & Simon, 1987). Yew is sensitive to light and temperature change and will be threatened by increased exposure to dessicating heat resulting from tree canopy loss (Busing et al, 1995). The protection of Pacific yew sites should promote good water quality and more stable watersheds. Animal use of yew sites is high. Yew provides cover for large ungulates and the proximity to water provides for a high concentration of birds and small mammals. Yew sites are likely relict from past fires owing to their moist microenvironment. Yew is intolerant of any fire. Severe hedging from large ungulates can eliminate yew from seeps and springs. Mature yew is considered to be 250 to 350 years old (Johnson & Simon 1987).

Potential threats to TES plants in coniferous forest habitat are: changes in light regimes, changes in soil moisture and microsite humidity due to loss of canopy closure; grazing, prescribed burning in the spring; soil disturbance from logging activities, road construction and maintenance. For clustered lady's slipper, fires severe enough to burn through the duff layer and into the organic horizons may damage the shallow

rhizome/root system. Harrod et al. (1997) studied fire effects on *C. fasciculatum* on the Wenatchee NF. Their work suggests that the species cannot tolerate high-intensity fire that eliminates the duff layer, as indicated by a lack of roots and rhizomes found in excavations after fire. Cordilleran sedge can appear after fire events, but is believed to be sensitive to grazing. Opening canopy for cordilleran sedge, through mechanical treatment or fire may provide habitat, but may also make plants more susceptible to grazing.

The following species are suspected to occur in coniferous forest in the LJCRP, but have not been documented there.

Buxbaumia aphylla				Bug on a Stick Moss	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G4G5	S2	OR-STR	D	S	Widespread, circumboreal

Habitat Description
A pioneer on dry, mineral-poor soil and well-decayed wood, in exposed to shaded sites in forests, cutbanks of trails and roads, and recovering burns. In Oregon and Washington, elevation mostly 4000-6000 feet. Forest associations include Pinus contorta, Pseudotsuga menziesii, Tsuga heterophylla. No canopy to closed canopy, and forest age class does not seem to be important.

Carex cordillerana				Cordilleran sedge	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G3G4	S2	OR-SEN	D	S	Regional endemic (inland PNW, northern Rockies)

Habitat Description
Naturally disturbed rocky slopes with organic layer and leaf litter in mesic mixed forests, or disturbed open grassy slopes. Moist, shady woods; warm-moist plant associations.

Cypripedium fasciculatum				CLUSTERED LADY'S-SLIPPER	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G4	S2	OR-SEN	D	S	Widespread, western US

Habitat Description
Mixed conifer stands, mesic forests, around springs. Forest, grand fir to Ponderosa pine, and warm riparian forests.

Listera borealis				Northern twayblade	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G4	S1	OR-SEN	D	S	Southwesternmost edge of range

Habitat Description
Moist, humus or mossy mixed conifer or (cool-moist) hardwood forests, swamps, often along cold streams

Ptilidium pulcherrimum				naugehyde liverwort	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G5	S1	OR-SEN	D	S	Widespread, circumboreal

Habitat Description
On trunks and branches of living trees and shrubs; or more rarely on decaying wood, among boulders in talus slopes, ledges of cliffs, and very rarely on soil, but generally in cool moist habitats between 3800 and 8000 feet on the W-W NF so would include Pseudotsuga menziesii , Abies grandis , Abies lasiocarpa , and Picea engelmannii associations

Rhizopogon subclavitisporus				truffle	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G2G3	S1	OR-STR	D	S	Regional endemic, Oregon east of Cascade crest to northern Idaho, apparently rare.

Habitat Description
In duff under mixed conifers, mycorrhizal

Rhizopogon bacillisporus				truffle	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G2G3	S1	OR-STR	S	S	Regional endemic, rare

Habitat Description
Mycorrhizal on conifers, coniferous forest

Schistostega pennata				goblin's gold (moss)	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G3G4	S2	OR-SEN	S	S	Widespread, circumboreal

Habitat Description
In soil on root wads of fallen trees; on damp, acidic rock, soil and decaying wood, in dark places, such as openings of caves and mine shafts, crevices, overhangs. Often pioneer on disturbed soil. In ID, on root-wads sometimes in sunny areas.

Tetraphis geniculata				bent stem moss	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCR**	**Range**
G3G5	S1	OR-SEN	S	S	Widespread, Russian Far East, Japan, Western and Eastern North America

Habitat Description
On the cut ends and sides of well decayed logs and stumps, occasionally on peaty banks; moist conif. forests. Rarely on rocks. In mature to late seral forests with closed canopies. Found from sea level to subalpine elevations.

Grasslands (Moist and Dry Upland Herbland PVGs)

Grasslands are composed of upland herbaceous vegetation dominated by grasses, and include both moist and dry bunchgrass habitats. Meadows and grass or grass-like dominated riparian areas are separate habitat groups. There are two grassland species documented in the LJCRP, green-band mariposa lily (*Calochortus macrocarpus v. maculosus*) and rough rabbitweed (*Pyrrocoma scaberula*). Both are regional endemics, meaning they are only found in our part of the world. There are thirteen records (Oregon Biodiversity Information Center) of rough rabbitweed in the Joseph canyon area, only one is in the project area, the other twelve are adjacent, with eleven on Nez Perce precious lands and one on BLM land. Rough rabbitweed is a composite (in the daisy/ sunflower family) that grows in deeper grassland soils with Idaho-fescue, often in transition zones between grassland and Doug fir-ponderosa pine stringers. It is remarkable that there is only one known population on USFS lands in the LJCRP project area. Nez Perce Precious Lands to the north are not grazed. It is unknown at this time what factors influence the presence or absence of rough rabbitweed. Green-band mariposa lily is a member of the lily family, and like many lilies has a corm or strachy bulb that helps this plant survive in the more xeric rockier parts of the Joseph canyonlands. Green-band mariposa lily is slightly more plentiful with ten populations within the LJCRP and another six populations on other land ownerships. This species is a seasonal round plant for the Nez Perce tribe. Both green-band mariposa and rough rabbitweed are concentrated at the very north end of the LJCRP, extending north into other land ownerships. The known site of *Pyrrocoma scaberula* is not near any project activities. Moist upland grasslands, those in the Idaho fescue plant associations, are also habitat for Spalding's catchfly. Rough rabbitweed sites were found during searches for the rare, endangered catchfly (Roger Ferriel, BLM botanist, pers. comm.). Spalding's

catchfly is also found at the bases of toe-slopes in Idaho fescue grasslands (S. Geer, USFS botanist, pers. comm.), which can be drier sites than the rough rabbitweed sites.

The suspected plant (strategic species), needle leaf sedge (*Carex duriuscula*) is a small inconspicuous grasslike plant that grows in dry prairie, sagebrush steppe and open forest. In our area it is a glacial relict, where small isolated populations were left after the last glacier retreat. Current documented populations are in the northern Rockies. There is one historic site from Baker county dated 1938. Flathead larkspur (*Delphinium bicolor*) is suspected in the project area and is found in dry meadow edges, sage scrub, open woodlands and woodland edges, and in seepy areas in dry forest.

For the most part, moist upland herbland is in good to fair condition within the project area. Dry upland herblands are generally in fair to poor condition in the project area. The generally poor condition of dry upland herblands may be due to drier soil conditions and shorter growing seasons in droughty years which may make recovery slower than recovery of moist upland herblands, even when management is changed in a positive direction. Moist grasslands and dry grasslands are both at risk from degradation due to grazing, which can include increases in size and connectivity of bare soil patches, loss of biological soil crusts, and increases in invasive non-native annual grasses and noxious weeds. The dynamics of season of burn and understory vegetation are not well understood, and the effects of low-severity prescribed fires may be different from high-severity prescribed fires or stand-replacing fires; for example, greater exotic species richness in high-severity fires (Bartuszevige and Kennedy 2009). Prescribed burning must be done in coordination with grazing so that grasslands have time to recover from burning prior to grazing. Idaho fescue is often suppressed for a few years after wildfire, after which it regains its former cover, while other species in Idaho fescue communities return to pre-fire cover in the first year after fire. Blue bunch wheatgrass plant associations typically regain pre-fire cover in the first year after fire (Johnson and Swanson, 2005). Other threats to grasslands are ground disturbance from road construction and maintenance, and logging.

Within this habitat type HCNRA Rare Combinations of Outstanding and Diverse Ecosystems ***Mountain Big Sagebrush/Idaho Fescue*** plant association is included.

The mountain big sagebrush/Idaho fescue plant association is separated topographically into a steep slope type found at higher elevations in the Wallowa and Seven Devils Mountains and a gentle ridgetop type at moderate elevations across the dissected plateau tops of the HCNRA. In late seral stands Idaho fescue is the principal associate with mountain big sagebrush. With degradation, fescue declines while the following plants increase: mountain brome (BRCA), Hood's sedge (CAHO), Wyeth's buckwheat (ARHE), yarrow (ACMIL), and groundsel (SEIN). Heavy site deterioration results in dramatic increases by tailcup lupine (LUCA) and Wyeth's buckwheat (ERHE).

Past sheep grazing and use has eliminated many of these subalpine-montane sagebrush communities. In highly disturbed communities, Wyeth's buckwheat, mountain brome, yarrow, and golden buckwheat (ERFL) often replace the Idaho fescue. However, Hood's sedge tends to remain intact on moist concavities and deeper soil areas with Idaho fescue.

This high elevation type occurs on shallow gravelly soils from 7,700 to 7,900 feet in elevation, and on southwesterly aspects. Slopes average 40 percent. Total herbaceous production from two sampled sites ranged from 200 to 600 lbs./acre (dry wt.). The

occurrence of this shrub/bunchgrass community in the HCNRA is limited. Communities occur on the northern extremities of HCNRA where broad ridgetops consist of Columbia River basalts with loessal soils derived from the Columbia River basin. It is here that limited stands occur. Daubenmire (1970) recognized these stands as disjunct edaphic climax populations that are relict from a hypsithermal period when climates were more conducive for more widespread, contiguous stands in the area. Today's population is centered on Cold Springs Ridge in the Downey Saddle and Grasshopper Ridge vicinity north of the Frog Pond. A second area of occurrence in the HCNRA is in the Seven Devils Mountains. In the Blue and Wallowa Mountains outside the HCNRA this same plant association is commonly found. The unique character of these HCNRA communities occurs in their disjunct nature as outliers in the Seven Devils and on the southern edge of the Palouse Region.

The sensitive species listed below, are documented in grasslands within the LJCRP area

Calochortus macrocarpus v. maculosus				GREEN-BAND MARIPOSA LILY	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G5	S2	SEN	D	D	Regional endemic

Habitat Description

Dry plains, rocky slopes, sagebrush scrub, pine forests, usually in volcanic soil; 300-2700 m (18). Dry grasslands, ridge tops. In rocky, basaltic derived soils, on hillsides, rock outcrops and cliff bands. In grasslands on steep slopes.

Pyrrocoma scaberula				ROUGH RABBITWEED	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G3	S2	OR-SEN	D	D	Regional endemic

Habitat Description

Mesic canyon grasslands (ID fescue) with deep soil and transition zones between grasslands & P-pine communities

The following species are suspected to occur in grasslands in the LJCRP, but have not been documented there.

Carex duriuscula				NEEDLELEAF SEDGE	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G5	SH	OR-STR	S	S	Widespread

Habitat Description

Dry prairie, sagebrush steppe, open forest

Delphinium bicolor				FLATHEAD LARKSPUR	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4G5	S1	OR-SEN	D	S	Regional endemic

Habitat Description

Dry meadow edges, sage scrub, open woodlands and edges. Seepy areas in dry forest.

Silene spaldingii				SPALDING'S CATCHFLY	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G2	S1	FT	D	S	Regional endemic, PNW

Habitat Description

Deep-soiled grasslands, often w/Idaho fescue, sometimes on fringes of Ponderosa Pine forest. Soils are loess over basalt and sometimes gravely.

Lithosols and Rigid Sagebrush Steppe

Lithosols are habitats with very shallow soils with little zonation on poorly weathered basalt or andesitic bedrock. While the soils can be saturated following spring snow melt, they dry quickly and are exposed to full sun for the entire growing season. Plants adapted to this harsh environment usually bloom and fruit early in the growing season. Basalt lithosols can be found in the dry upland shrubland potential vegetation group or dry upland herbland potential vegetation group. Basalt lithosols may also be found as small inclusions within a larger matrix of grassland and shrublands, as well as adjacent for forests. The common plant associations within the dry upland shrubland and dry upland herbland potential vegetation groupings are stiff sagebrush or low sagebrush/Sandberg's bluegrass, bluebunch wheatgrass/Sandberg's bluegrass or Sandberg's bluegrass/one-spike oatgrass. Countryman, et al (2012) found that conditions had improved in the dry shrubland potential vegetation group from 30 years earlier, but that this improvement has slowed. The dry herbland potential vegetation group has experienced invasion by nonnative plants resulting in conversion of some lands to exotic herblands (Hann 1997).

There are three sensitive plants documented from lithosol habitats: Wallowa ricegrass (*Achnatherum wallowaense*) is most consistently found on lithosols, while Snake River Daisy (*Erigeron disparipilus*), and Davis fleabane (*Erigeron engelmannii v. davisii*) can be found on both lithosols and dry grasslands. Wallowa ricegrass is known from Wallowa and Crook Counties in Oregon. Davis fleabane is endemic to southwest Idaho with disjunct populations in southwest Washington and northeast Oregon. Snake River daisy is found in Idaho near the Snake River and in northeast Oregon. Wallowa ricegrass, Davis fleabane, and Snake River daisy are all locally abundant in the project area, yet all should be considered narrow endemics, meaning they are not well distributed throughout the world, or even within the region. The strategic species, eight-spored moss lichen (*Thelnella muscorum v. octospora*), a component of biological soil crusts, is suspected in the project area. Eight spored moss lichen is a fairly cosmopolitan lichen, but is included here because of its affinity with sagebrush and bunchgrass species, and to represent soil crusts, which are an ecologically important functional group in rangeland systems.

Lithosol habitats within the LJCRP are frequently found between forested stringers on ridgetops and are generally flat, making them attractive locations for temporary roads, landings, and parking spots for logging equipment. Other threats to lithosol habitat include livestock trampling, grazing and trailing especially before soils have dried sufficiently; salt blocks, and invasion of non-native invasive grasses such as ventenata (*Ventenata dubia*), cheatgrass (*Bromus tectorum*)and medusahead (*Taeniatherum caput-medusae*).

Within this habitat type HCNRA Rare Combinations of Outstanding and Diverse Ecosystems ***Douglas' Buckwheat-Sandberg's Bluegrass Plant Community Type*** is included. Shallow soil ridgetop communities dominated by Douglas' buckwheat (ERDO) with Sandberg's bluegrass (POSA3) define this plant community type. Perennial forbs usually associated with these communities are stonecrops (SEST, SELA2), biscuitroots (LOLE, LOCO2), big-head clover (TRMA), lovely penstemon (PEEL), sticky phlox (PHVI3), Holboell's rockcress (ARHO), hoary balsamroot BAIN), and Snake River daisy (ERDI4). As with many buckwheat communities, the ERDO/POSA3

type may be a product of past soil loss resulting from overgrazing and subsequent soil and wind erosion. With disturbance, erosion pavement and bare ground increase with a marked decline in moss cover. Forbs tending to increase are pussytoes, biscuitroots, bighead cover, lovely penstemon, and sticky phlox. Shallow soil ridge top scablands dominated by Douglas' buckwheat with Sandberg's bluegrass define this plant community type. The community is limited in extent and is located on Cold Springs Ridge. Although Daubenmire (1970) classified a Douglas' buckwheat-Sandbergs bluegrass habitat type in central Washington, its plant composition was significantly different. These communities in northern Wallowa County are restricted to broad ridges trending toward the Grande Ronde canyon. It appears to be restricted to higher bunchgrass ridge tops where higher precipitation is available. Since it is restricted to a few ridge tops in the HCNRA, it warrants listing as an outstanding and diverse ecosystem.

Achnatherum wallowaense				WALLOWA RICEGRASS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G2G3	S2S3	OR-SEN	D	D	Narrow endemic, Wallowa and Crook Counties

Habitat Description
Often with rigid sagebrush in dry grasslands & scablands (lithosolic substrates) at mid elevations

Erigeron disparipilus				SNAKE RIVER DAISY	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G5	S2	OR-SEN	D	D	Local Endemic: mostly SW Idaho, some SW WA and NE OR

Habitat Description
In dry grasslands and shallow soiled plateaus and ridges / ridge shoulders and rocky slopes at mid elevations

Erigeron englemannii v. davisii				DAVIS FLEABANE	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G3G4	S2	OR-SEN	S	S	Local endemic: Idaho near the Snake River and NE Oregon

Habitat Description
In dry grasslands and shallow soiled plateaus and ridges / ridge shoulders and rocky slopes at mid elevations

Thelenella muscorum v. octospora				EIGHT-SPORED MOSS CRUST (lichen)	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4G5	S2	OR-STR	S	S	Interruptedly circumboreal. Western United States, western Canada, Scandinavia, Europe, Russia

Habitat Description
A component of biological soil crusts in semi-arid shrub-steppe and grassland below elevations of 4,000 feet. Vegetation types are Juniperus occidentalis, Artemisia rigida, and Artemisia tridentata ssp. wyomingensis associations with Festuca idahoensis, Poa secunda, and Pseudoroegneria spicata. But also On soil, rock, and dead or dying mosses and lichens in dry woodland, prairie, shrub-steppe, and subalpine forest, up to 11,000 feet elevation

Cliffs, rock outcrops, and talus

Cliffs and rock outcrops have vertical faces where very few plants are able to survive. Talus is accumulated boulders and cobbles at the base of cliffs or on steep slopes. Many of the species included in this habitat group, such as Hells Canyon rockcress (*Arabis hastatula*), common silver moss (*Anomobryum filiforme*), candle-snuffer moss (*Encalypta brevipes*), membrane-leaved monkeyflower (*Mimulus hymenophyllus*), and violet mock brookfoam (*Suksdorfia violacea*) are found primarily on cliffs and outcrops. Two of the suspected species in this group have a broader range of habitats, but include rock outcrops. Sharp tipped twisted moss (*Tortula mucronifera*) can be found on soil and on tree roots, as well as sheltered ledges and crevices of rock outcrops and cliffs. Many flowered phlox (*Phlox multiflora*) grows on basalt cliffs, rocky outcrops, as well as rocky openings in dry forest. Rock outcrops are assumed to be in good condition with a stable trend because they are primarily composed of rock thus resistant to soil compaction and erosion; however, plants growing on rocky areas in forests may be vulnerable during logging operations activities such as felling and yarding. Steep to acute slopes, unstable footing, and scant vegetation of talus, cliffs, and rock outcrops make them generally unattractive to wild ungulates and livestock. Road construction and potential as rock quarries are the primary management concerns.

Species that are suspected on talus, cliffs and rock outcrops are listed below:

Arabis hastatula				HELLS CANYON ROCKCRESS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G2	S2	OR-SEN	D	S	Regional endemic, Oregon Cascades and Wallowa Mountains

Habitat Description
basalt outcrops/cliffs; moderate to high elevations, within cold forest

Anomobryum filiforme				COMMON SILVER MOSS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4G5	S1	OR-STR	D	S	Widespread in the temperate regions of the Northern and Southern Hemispheres.

Habitat Description
Damp outcrops in or near temperate forests, earth cliff crevices, cliff crevices, on tussock tundra with seeps and late snow melt areas, and on granitic outcrops

Encalypta brevipes				CANDLE-SNUFFER MOSS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G3	S1	OR-SEN	S	S	Interruptedly circumboreal. In the PNW, Alberta, British Columbia, Washington, and Oregon.

Habitat Description
Soil on ledges and in crevices on cliffs, reported from both igneous and siliceous substrates - various elevations

Mimulus hymenophyllus				MEMBRANE LEAVED MONKEYFLOWER	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G1	S1	OR-SEN	D	S	Local endemic, Wallowa County, Idaho Co. Idaho and

SW Montana

Habitat Description
on steep moist soil and seeps and seeping cracks in basalt and limestone in low elevation canyons

Phlox multiflora				MANY-FLOWERED PHLOX	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4	S1	OR-SEN	D	S	Disjunct, in our area, most of the population is in MT, WY, ID

Habitat Description
Basalt cliffs, rocky outcrops, rocky openings in dry forest. Wooded rocky areas, as well as in openings in the forest. Loose substrate rather than exposed hard rocks. Residual soils, gravels, cobbles.

Suksdorfia violacea				VIOLET MOCK BROOKFOAM	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4	S1	OR-SEN	S	S	Disjunct, British Columbia south along the east side of the Cascades to the Columbia River Gorge, and east to northeastern Washington, northern Idaho, and northwestern Montana.

Habitat Description
In moss on wet cliffs, cracks of moist talus slopes, on basalt. Habitat sometimes is only wet in the spring.

Tortula mucronifera				SHARP-TIPPED TWISTED MOSS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G5	S2	OR-SEN	S	S	Widespread, throughout the Northern Hemisphere

Habitat Description
On soil, tree roots, and sheltered ledges and crevices of rock outcrops and cliffs. Elevation of known sites ranges from 5000-7000 feet. Known vegetation types are rock outcrops in Abies forest in SW Oregon, and riparian forest on Steens Mountain composed of Betula occidentalis, Populus tremuloides, and Populus trichocarpa. Reportedly a calciphile but in Oregon and Washington on acid rocks as well.

Springs and seeps

Springs are points where groundwater emerges and flows. Groundwater also feeds seeps, but seeps do not produce perennial flow. Springs and seeps are typically small, but are well distributed on the Wallowa-Whitman National Forest. Seeps are generally less well documented on the forest. Seeps and springs are often developed for cattle troughs. Many of these areas have been dewatered and/or trampled due to these developments historically. Many developed springs now have fences to protect the water source. These areas provide important habitat for several sensitive plant species, most notably several species of mosses and liverworts.

Species suspected to inhabit seeps and springs are displayed in the following table.

Eleocharis bolanderi				BOLANDER'S SPIKERUSH	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4	S2	OR-SEN	S	S	Widespread, western USA

Habitat Description
Mid elevation summer-dry meadows, springs, seeps, ephemeral stream margins

Entosthodon fascicularis					BANDED CORD MOSS
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4G5	S1	OR-SEN	S	S	Widespread, BC, AZ, CA., ID, OR, WA, Europe

Habitat Description
On seasonally wet, exposed soil in seeps or along intermittent streams. It is usually hidden among grasses, other mosses, and litter, and periodically on humid or damp earth of terraces of exposed rock outcrops &; may be found on recently disturbed soil & occasionally present on thin soil overlying limestone; found below 3,000 feet.

Isoetes minima					MIDGET QUILLWORT
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G1G2	S1?	STR	D	S	Regional endemic? Documented from OR, WA and BC

Habitat Description
Damp, bare places on prairies, on damp ground. Locally common in saturated soil

Moist Meadows

Moist meadows are typically saturated in the spring, but by mid to late summer the water table has fallen below the soil surface. In LJCRP there are many moist meadows interspersed within forested areas. Several sensitive plant species are found in the transition zone between the wet or moist meadows and the surrounding forest or otherwise drier areas, such as moonworts (*Botrychium spp.*), dwarf Phacelia (*Phacelia minutissima*), and Douglas' clover (*Trifolium douglasii*). Camas and yampa are two important food plants that occur in these habitats. Main threats are road or trail construction or maintenance, recreationists, off highway vehicles, forage seeding, poorly designed or broken water developments, changes in the water table, possibly logging and burning projects, and grazing.

Quaking Aspen

Although the HCNRA Rare Combinations of Outstanding and Diverse Ecosystems Quaking aspen plant association is not documented from LJCRP within HCNRA, a number of sites were found in the southern portion of LJCRP. Aspen communities are communities of concern throughout the Blue Mountain ecoregion. Quaking aspen communities are rare in the HCNRA, as well as in the rest of the Blue Mountain ecoregion, and generally occur in relatively small, scattered clones. Their presence is usually associated with meadows or areas within conifer stands where subsurface moisture is present throughout most of the growing season. Grassland management, forested vegetation management, and fire can all influence the propagation and survival of aspen communities. Clones are generally limited to fringes around meadows or as islands in ridge top grasslands where subsurface moisture is available throughout most of the growing season. Cattle and big game generally favor these stands. Mature stands are generally in decadent condition because of old age, disease, overshading, crowding from encroaching conifers, and a general lack of vegetative reproduction due to browsing of

root sprouts by ungulate wildlife species and domestic livestock. Aspen is an early-seral, pioneer species that is propagated by root suckering after disturbances like fire or removal of mature stems. Maturation of root sprouts to older age classes most often requires some protection from grazing ungulates.

The following species are suspected to occur in meadows in the LJCRP, but have not been documented there.

Allium geyeri v. geyeri — GEYER'S ONION

Global Rank	State Rank	R6	WAW	LJCRP	Range
G4G5	S1	OR-SEN	D	S	widespread, western US

Habitat Description
Moist, open slopes, meadows, or stream banks or summer-dry grasslands at low to mid elevation

Botrychium crenulatum — CRENULATE MOONWORT

Global Rank	State Rank	R6	WAW	LJCRP	Range
G3	S2	SEN	D	S	Widespread, western US

Habitat Description
Moist woodlands, meadows, & grassy roadsides.

Botrychium hesperium — WESTERN MOONWORT

Global Rank	State Rank	R6	WAW	LJCRP	Range
G4	S1	SEN	D	S	Widespread, western US, Canada, Great Lakes

Habitat Description
Mid to high elevation open-canopied forests, also in gravelly soils, or open meadows.

Botrychium lunaria — COMMON MOONWORT

Global Rank	State Rank	R6	WAW	LJCRP	Range
G5	S2	OR-SEN	D	S	Widespread, North America, northern Europe, NE Russia

Habitat Description
Open (to lightly wooded) meadows as well as scree slopes, mesic woodlands on moist but well-drained soils with a neutral pH

Botrychium pedunculosum — STALKED MOONWORT

Global Rank	State Rank	R6	WAW	LJCRP	Range
G2G3	S1	SEN	D	S	Widespread, Rocky Mountains, with disjunct populations in Quebec and the Alaskan peninsula

Habitat Description
mountain meadows, roadside meadows, brushy secondary woodlands, and open to closed canopy forests.

Muhlenbergia minutissima (Annual) — ANNUAL DROPSEED

Global Rank	State Rank	R6	WAW	LJCRP	Range
G5	S2	OR-SEN	S	S	Widespread, western USA

Habitat Description
Sandy riverbanks, moist meadows, or open and rocky and apparently dry slopes (9). Open, more or less distrubed, sandy slopes and seeps, 400-2300 m (111).

Phacelia minutissima (Annual) — DWARF PHACELIA

Global Rank	State Rank	R6	WAW	LJCRP	Range
G3	S1	SEN	D	S	Edge of range, most reports are from Idaho, with outliers in Washington, Oregon, and

Nevada.

Habitat Description
Moist meadow and seep edges, or on vernally wet open meadows and barren slopes. Reported to occur with aspen in other areas. Gravely, clay-loam, well-drained soils.

Trifolium douglasii				DOUGLAS' CLOVER	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G2	S1	SEN	D	S	Regional endemic, Oregon, Washington, Idaho

Habitat Description
Moist or mesic meadows, prairie remnants, along riparian areas along streams. In swales, along intermittent streams, and in vernally wet areas. Alluvial soils, ash/clay, fine silt to sandy.

Wet meadows, riparian

Wet meadows are saturated throughout the growing season with the water table at or slightly below the soil surface. Potential vegetation groups included in wet meadow habitat are the warm riparian herb, and the cool associations of the cold riparian herb group. This habitat type is where many sensitive plant species occur. Most rare non-vascular plants are found in these habitat types. Several sensitive plant species are also found in the transition zone between the wet or moist meadows and the surrounding forest or otherwise drier areas.

Riparian areas also have water close to or at soil surface. Many of the riparian areas create high humidity sites which provides excellent habitat for non-vascular plants (mosses, liverworts), and lichens. Consequently, many rare non-vascular plants are found in riparian areas. Several sensitive plant species are also found in the transition zone between the riparian zones and the surrounding uplands. Culturally significant plants that occur in this habitat type include Pacific yew, red osier dogwood, willows, elderberries, and chokecherries.

Both wet meadows and riparian areas share threats from changes in hydrology, trampling and browsing, and invasive wetland plants, such as reed canary grass.

The following species are suspected to occur in wetlands within the LJCRP area.

Botrychium montanum				MOUNTAIN GRAPE-FERN	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G3	S2	OR-SEN	D	S	From northern CA north through OR and WA to BC and SE Alaska. East it extends through northern ID and NW Montana.

Habitat Description
Dark, coniferous forests, usually near swamps and streams; 1000-2000 m (18). Wet meadows, saturated soils. Often growing in a bed of mosses. This species tends to grow in wetter sites than the other Botrychiums.

Pleuropogon oregonus				OREGON SEMAPHOREGRASS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G1	S1	OR-SEN	S	S	Regional endemic, documented from Union Co and Lake Co, OR.

Habitat Description

Elev. 900-1600 m (22). Open, wet meadows, marshes, and riparian areas. Grows in areas of standing or flowing water early in season. Documented sites are not near forested habitats. Sluggish water in depressions and sloughs. Irrigation ditches in S. OR.

Rorippa columbiae				COLUMBIA CRESS	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G3	S3	SEN	S	S	Regional endemic, mostly OR but into WA and N CA.

Habitat Description
Stream banks, ditches, margins of lakes and ponds, meadows, roadsides, gravel bars, wet fields. Low to moderate elevations.

Rotala ramosior				LOWLAND TOOTHCUP	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G5	S2	SEN	S	S	Widespread, N America, S America, Taiwan

Habitat Description
Damp, bare places on prairies, on damp ground. Locally common in saturated soil

Sphlachnum ampullaceum				Purple-vased stink moss	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G5	S1	OR-SEN	S	S	Circumboreal.

Habitat Description
Forming green sods on old dung of herbivores, or on soil enriched by dung (completely humified), in bogs, peatlands or other wetlands - from 500 to 5000 feet elevation

Trollius laxus ssp.				AMERICAN GLOBEFLOWER	
Global Rank	**State Rank**	**R6**	**WAW**	**LJCRP**	**Range**
G4	S1	OR-SEN	D	S	Edge of Range

Habitat Description
Montane to alpine moist sunny wet meadows, (+/- acidic) seeps, bogs, and riparian openings in mixed conifer stands with a gentle flow of water running through it, vernally wet swales in spruce/fir forest, often accompanied by alders.

Resource Indicators and Measures

Diversity, Viability, Habitat

The following tables show diversity as a function of native to non-native plants in LJCRP. If the Blue Mountain ecology plots are representative of most of the landscape, cover in invasive non-native species is low. However, disturbed areas such as old landings and roadsides, likely have higher cover in invasive non-native species. The diversity index is what is expected for the habitats listed.

Lower Joseph Creek Restoration Project

Habitat	Total Species Richness	Native Species Richness	Percent Relative Cover in Native Species	Diversity Index
ARRI/POSA3 (SCAB)	60	53	93	3.7
Cold Moist FEID	140	116	89	4.4
Dry UH	126	109	91	4.4
Moist UF	80	73	95	3.9
Dry UF	139	110	86	4.3

HRV for canopy cover in forested stands in the Blue Mountains:
Range of variation information for tree canopy cover on the dry upland forest PVG (Powell 2012). The table below shows the range of percent of the landscape with high, moderate and low density stands in dry upland forest.

Tree Canopy Cover Class	RV (%)	Current Condition in LJCRP (%)
Low (<40% canopy cover)	40-85	26
Moderate (40-50% canopy cover)	15-30	36
High (>50% canopy cover)	5-15	38

Range of Variation information for tree canopy cover on the moist upland forest PVG (Powell 2013). The table below shows the range of percent of the landscape with high, moderate and low density stands in moist upland forest.

Tree Canopy Cover Class	RV(%)	Current Condition in LJCRP (%)
Low (<75% Canopy Cover)	20-40	18
Moderate (75-85% Canopy Cover)	25-60	34
High (>85% Canopy Cover)	15-30	46

Grassland Range of Variation
In an evaluation of Blue Mountain ecology plot data, 67 percent of the sampled plots in the moist upland herbland potential vegetation group within the LJCRP were in phase A or B (good to fair condition), n= 24. In the dry upland herbland potential vegetation group, 8 percent of the sampled plots within the project area were in phase A or B, n=12. Generally, as conditions decline, there is an increase in bare soil, connectivity of bare soil patches and non-native species.

Desired Condition

Forest Service objectives for threatened, endangered, proposed, and sensitive species (FSM 2672.41) are to:

- To ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species.
- To comply with the requirements of the Endangered Species Act where actions of Federal agencies not jeopardize or adversely modify critical habitat of Federally listed species.
- To provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process.

The goals stated in the WWNF LRMP regarding TES species are:

- To protect and manage habitat for the perpetuation and recovery of plants and animals which are listed as threatened, endangered, or sensitive.

- To assure that management activities do not jeopardize the continued existence of sensitive species or result in adverse modification of their essential habitat.

Relevant HCNRA CMP goals are:

- Maintain or restore habitat to provide viable populations of rare and endemic plant species in the HCNRA.
- Maintain and restore biologically unique and rare combinations of outstanding and diverse ecosystems and parts associated therewith to ensure their continued functionality and sustainability.
- Maintain and restore biologically unique and rare combinations of aquatic, terrestrial, and atmospheric habitats.

Environmental Consequences

Issues and Purpose and Need Addressed and Indicators for Assessing Effects

Table 1: Resource indicators and measures for assessing current conditions and effects

Resource Element	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source
Diversity	Native Plant Diversity	Shannon Diversity Index	Yes	WWNF LRMP Diversity S-2.1, HCNRA CMP Veg-O5,
Viability	ORBIC and R6 rankings	Range, Population Size, Threats	Yes	WWNF LRMP TES S&Gs HCNRA CMP TES-01,
Habitat	Quality of Vegetation Structure and Composition	Historic Range of Variability % Departure	Yes	WWNF S&Gs HCNRA CMP Veg-02, Veg-03

Methodology

The Lower Joseph Creek restoration project is focused on creating a more resilient over-story with structure and composition trending towards historic range of variability. The goal is to reintroduce fire in its natural role to this landscape. Understory structure and composition is of concern for this restoration effort. This analysis includes as resource indicators, native plant diversity, quality of structure and composition. The resource elements, habitat, diversity and viability are described in detail in the methodology section of Affected Environment.

Incomplete and Unavailable Information

Landscape scale analysis does not allow for detailed site-specific plant surveys. While TES surveys were done in high probability areas for TES plant species within the project area, it is possible that activities could be implemented in areas that have not been surveyed. Therefore, it is possible that there may potentially be impacts to undiscovered populations of sensitive plants.

Some sensitive plant species don't produce above-ground plants every year. The same is true for mushrooms. Truffles fruit below ground and require soil disturbance to locate. Vascular plants include some grape-ferns (*Botrychium spp*.), and many annual species which are dependent upon sufficient early spring rains. Some of the annual sensitive species include least phacelia (*Phacelia minutissima*), annual muhly grass (*Muhlenbergia minutissima*), and lowland tooth-cup (*Rotala ramosior*). It is possible that surveys may not detect these plants in years when conditions do not favor germination. Some species, such as the least phacelia, annual muhly grass, and grapeferns, are so tiny and difficult to find in dense vegetation that even expert botanists may overlook them during surveys. Many of the non-vascular plants are very difficult to identify; it is possible that botanists may also overlook some of these species. For these reasons, it is not possible to state with 100 percent certainty that all sensitive plant species would be detected during sensitive plant surveys.

There are no empirical studies on the impacts of logging, burning, or grazing to most sensitive plant species that occur on the Wallowa-Whitman National Forest. The strategy for management of known populations has generally been avoidance of activities that may impact known populations and managing for habitat to protect undetected populations and individuals. Therefore, all discussion of potential impacts to sensitive plant populations and habitat is based upon general experience and inferred responses based upon observations and studies of more common species.

Spatial and Temporal Context for Effects Analysis

The spatial context for this analysis is the project planning area. This scale is large enough to identify trends to sensitive species that could result from implementation this project. Since plants do not generally move over large areas quickly, and no downstream effects are anticipated, it is not necessary to analyze effects to sensitive plants outside of the planning area.

The temporal context for effects analysis includes short term and long term effects. Short term effects for this analysis are considered to be one to two years after project implementation. These would generally be from direct effects such as ground disturbance or incineration. Long term effects for this analysis are considered to be longer than two years. These effects would generally be from indirect effects such as changes in sunlight, hydrologic regimes, and changes in animal grazing patterns and intensity.

For the cumulative effects analysis, the spatial context being considered is the project area. Cumulative effects are discussed in terms of wildfire and vegetation management activities that have occurred since 2004 and as changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 10 years in the future at which time the majority of the actions proposed will have been completed and the vegetation response to these actions has occurred.

Basis of Effects Determinations

The four possible effect determinations for sensitive plants are outlined in Forest Service Manual 2670. These definitions were used to guide the determination of effects:

- **No impact (NI)** When sensitive species occur in habitats which are not expected to be directly or indirectly affected in any way. This is also used for known specific existing populations where no project activities are proposed, or the population is buffered or otherwise protected from project activities.
- **Beneficial impact (BI)** When sensitive species, and their potential habitats, are expected to be favorably affected by a particular alternative.
- **May impact individuals or habitat (MIIH)** When sensitive species, and their potential habitats, occur that could possibly be negatively affected. This determination is used in cases where there is un-surveyed potential habitat, or where potential impacts are uncertain, or considered to be relatively minor. Additionally, this recognizes that even the most substantial impacts of the proposed action will not contribute to a trend toward listing the species under the Endangered Species Act. The effects are expected to be minor enough that they will not cause a loss of viability of the species in the planning area.
- **Will impact individuals or habitat and may contribute to a loss of viability (WIFV)** When sensitive species and potential habitat will most likely be negatively affected by the project. This determination is used in cases where negative impacts will clearly occur, and they are of a magnitude that they may contribute to crossing a threshold leading to Federal Listing under the Endangered Species Act.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Climate change effects are a component of cumulative impacts. Changes in climate influence vegetation, water, and disturbance frequencies; and these changes, in turn, influence one another. A change in one aspect causes a cascade of responses that, in some cases, counteract and, in others, magnify the initial change. Such interactions make prediction of the likely effects of climate change difficult at the scale of the LJCRP analysis area even if the nature of the climate change were known. For now, it is certain that changes will occur at a continental scale; however, how climate change in impact local landscapes in not well understood. Until the environmental responses are better understood, it will be difficult to predict with accuracy the environmental outcomes of particular land-use activities. Species most at risk of climate change are those with small geographic ranges (e.g., local endemics), narrow physiological tolerances, limited dispersal abilities, narrow habitat associations, strong interspecific dependencies, low genetic diversity, and those that have recently experienced population declines. Tools to predict the potential climatic changes as influenced by the LJCRP activities over the next 10 to 15 years have yet to be devised, but it seems unlikely that measurable changes will occur relative to this species (potential temperature and precipitation increases being the most likely climatic change in this part of the continent) over the short life of this planning document (Yates, 2012).

In the past, present, and reasonably foreseeable future, there have been, and will continue to be, projects and activities within the planning area that may cause impacts to sensitive

plants and their habitats. Projects and activities that create ground disturbance, change vegetative composition, and change domestic animal grazing patterns may potentially cause detrimental impacts to sensitive plant populations and habitats. These actions include road construction, timber harvest, fuel reduction treatments (landscape and pile burning, lopping and scattering of slash), fire suppression, recreation development, mining, and livestock grazing. In addition, restoration efforts such as road decommissioning, and stream improvements may also potentially impact sensitive plant populations and habitat. Road construction and recreation developments have permanently altered native plant habitat in limited areas of the planning area

Livestock grazing has occurred in most of the project planning area for decades and has resulted in changes in plant communities, especially in non-forested and riparian areas. Grazing has a direct effect on plants through plant herbivory, and trampling. Grazing can have an indirect effect on plant species by causing changes in shade, soil compaction, soil disturbance, smothering by cow pies, and alteration of nutrient cycling. The degree of impact to plant species from grazing is related to the timing, duration, and intensity of the grazing action, as well as the individual characteristics and habitat requirements of the species. Grazing will continue to occur in the project planning area.

A court decision in 2002 concluded that the Wallowa-Whitman National Forest noxious weed control environmental assessment was insufficient under NEPA (USDA Wallowa-Whitman NF. Page 2. 2013). The forest has been limited to non-chemical methods since this ruling . Because of this restriction on treatment methods, and limited funds, non-native invasive plants have undoubtedly increased in the project planning area over time. Non-native invasive plants may potentially outcompete and dominate sensitive plant habitat. The Forest currently has an invasive plant treatment draft EIS out for public review. Some of the alternatives propose to add the use of herbicides for treatment of these species. If one of the alternatives that propose the use of herbicides is selected (and implemented), the cumulative effects from non-native invasive plants should be reduced over time.

The historical abundance and distribution of sensitive species on the Forest is not known. Past activities have likely affected their current abundance and distribution. Beginning in approximately 1990, botanical surveys and biological evaluations were conducted for most Forest Service projects planned and implemented on the forest. As a result, activities conducted since 1990 have been designed to reduce impacts to sensitive species.

Alternative 1 – No Action

Effects

Under Alternative 1, the no action alternative, no management except fire suppression and implementation of pre-existing decisions would occur. Both known sites and possible undetected occurrences of threatened, endangered or sensitive plants would not be impacted by project activities. Sensitive species growing in partial shade in forest could lose habitat. Meadows and grasslands would be at risk for increased ingrowth of conifers and shrubs. Increases in ladder fuels resulting from fire suppression increases the risk of

larger hotter wildfires. Most of the TES species included are adapted to wildfire within the range of variability. Avoiders grow in rock outcrops or areas with high water tables. Adapters may be capable of root sprouting. Survivors may have deep

Alternative 2, the proposed action and Alternative 3

Since both of the action alternatives include similar activities and project design features, the analysis will focus primarily on a general discussion of potential effects. Then the individual alternatives will be compared in relation to the amount of area proposed for the various activities.

Design Criteria and Mitigation Measures

Project design criteria to protect sensitive plant populations, habitats, and culturally significant plants are included for both action alternatives (see Appendix 3: Botany-Related Project Design Criteria).

Direct and Indirect Effects for Alternatives 2 and 3

Locations of TES plants in relation to Project activities for alternatives 2 and 3 are in Appendix 5.

Coniferous Forest

There are no documented TES plant species in coniferous forest habitat within the LJCRP. However there are four bryophytes (*Buxbaumia aphylla, Ptilidium pulcherrimum, Schistostega pennata, Tetraphis geniculata*), two fungi (*Rhizogogon subclavitisporus, Rhizopogon bacillisporus*), and two vascular plants (*Carex cordillerana, Cypripedium fasciculatum*) suspected in forested habitats in the project area

There is only one historic record of *C. fasciculatum* from the Wallowa-Whitman NF and efforts to relocate this orchid have not been successful. *Rhizopogons* live below ground, making them difficult to detect and neither species has been found in our area, although *R. subclavitisporus* is documented from northern Idaho. Bryophytes such as *Ptilidium pulcherrimum* and *Tetraphis geniculata* require moist shady microsites.

Vegetation management actions that may have direct impacts to sensitive plants in upland coniferous forested habitats include commercial and non-commercial thinning, biomass removal, and associated yarding, slash piling, grinding, or scattering, and application and control of prescribed fire. Potential detrimental direct impacts include the destruction of sensitive plants from ground disturbance associated with cutting of trees, yarding trees, piling slash, or scattering slash. Road maintenance, decommissioning, and new construction can directly kill or dislodge sensitive plants.

Prescribed fire or slash pile burning could scorch sensitive plant individuals within the fire area, and also may kill plants under and directly adjacent to slash piles. Fire line

construction has the potential to directly kill or dislodge sensitive plants in the area that is denuded. Natural fire generally occurs in mid to late summer. Much of the prescribed fire is done in spring or early summer. This is the time of year when plants are actively growing. It is unknown if burning sensitive plants when they are actively growing would cause more mortality than when they may be senescent later in the summer. Prescribed fire after silvicultural treatments would remove understory vegetation, woody debris, and litter, impacting microclimate as well as soil temperature and moisture.

Indirect effects to forested areas resulting from logging and thinning would be loss of canopy closure and resulting changes in microclimate, altering the hydrologic regime and changing light intensity. Vegetation management may also alter the interaction of herbivores and plants. . *Cypripedium fasciculatum* and *Listera borealis* are both in the orchid family and probably require mycorrhizal fungi to establish. *Rhizogogon subclavitisporus* and *Rhizopogon bacillisporus* are mycorrhizal fungi. Mycorrhizal fungi are vital to nutrient and water uptake for many vascular plants including conifers. Many edible mushrooms found in coniferous forest are mycorrhizal including morels, boletes (Porcini), and truffles. Changes soil temperature and moisture can change the mycorrizal community, or eliminate it. Loss of coarse woody debris changes soil moisture retention during dry months, also affecting mycorrhizal fungi (Lippert, 2014). In the case of culturally significant plants, morel habitat may benefit from light burning. By opening up the canopy of the forest, grasses and other palatable plants may increase. This may in turn increase grazing activity in the treated areas. Conversely, logging created slash may impede travel by ungulates. Road work and new roads may also indirectly lead to an increase in grazing activity due to the increased ease of travel for animals on the roads. New and improved roads may also lead to increases in the amount of off-road driving to collect firewood, camp, and retrieve game. Road maintenance activities contribute to the movement of invasive species along road shoulders and ditches, and to and from quarry and waste disposal areas. Invasive species may potentially outcompete or prevent the recruitment of new sensitive plant populations. Project design criteria are included that should help to reduce the chance of increasing invasive plant abundance in the project planning area. Closure of temporary roads and currently closed roads that would be reopened should help to reduce these impacts in the long term. The risk would only occur during the time that the sale is active until the roads are reclosed, and or, decommissioned.

Many of the areas proposed for vegetation treatment activities were not specifically surveyed for this project. Therefore, it must be assumed that undiscovered populations of sensitive plant species may be impacted. Since most sensitive plant species occur in specific microhabitats, the probability that sensitive plant species may occur in the project planning area in these upland general forested habitats is relatively low.

None of the sensitive plant species that may occur in coniferous forest habitats on the Wallowa-Whitman National Forest are extremely rare on a global scale. Therefore, even if project activities may impact individual plants or habitat, implementation of this alternative should not increase the need for Federal listing of any sensitive species. In general the suspected TES species in LJCRP are found in moist upland forest rather than

in dry upland forest. Direct and indirect effects May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH).

Special Habitats

Grand fir/Pacific yew/Queencup beadlily this habitat should be conserved due to its contribution to biodiversity in the LJCRP area and its rarity within the Blue Mountain ecoregion. Johnson & Simon (1987) identified this plant association as being important to macrofauna such as deer and elk, as well as many species of birds. This plant association is at risk under both alternatives from both silvicultural treatments and prescribed fire. Pacific yew (Taxus brevifolia), is extremely sensitive to changes in microclimate and requires canopy closure to thrive, as well as long periods without disturbance (Busing 1995). Yew is found in the LJCRP in closed canopy mixed conifer stands in moist sites, and Johnson (1998) describes yew as an indicator of a high water table. Pacific yew is fire intolerant and slow to recover after wildfire (Busing 1995).Yew with a basal diameter (diameter at 6" above ground surface) of 9 inches and greater should be considered old trees (Crawford, 1983). The suggested mitigation is no treatments within yew stands.

Grasslands

Grasslands include both moist and dry bunchgrass habitats. There are two grassland species documented in the LJCRP, *Calochortus macrocarpus v. maculosus* and *Pyrrocoma scaberula*. Both are regional endemics, meaning they are only found in our part of the world. There are thirteen records (Oregon Biodiversity Information Center) of *Pyrrocoma scaberula* in the Joseph canyon area, only one is in the project area, the other twelve are adjacent, with eleven on Nez Perce precious lands and one on BLM land. *Calochortus macrocarpus v. maculosus* is slightly more plentiful with ten populations within LJCRP and another six populations on other land ownerships. Both *Calochortus macrocarpus v. maculosus* and *Pyrrocoma scaberula* are concentrated at the very north end of the LJCRP, extending north into other land ownerships. The known site of *Pyrrocoma scaberula* is not near any project activities.

Two *Calochortus macrocarpus v. maculosus* populations are adjacent to units that will be treated in Alternative 2, but not treated in Alternative 3. *Carex duriuscula, Delphinium bicolor, Silene spaldingii* are suspected to be within the project area and suitable habitat exists. Approximately 14, 840 acres of potential habitat, identified using a habitat model for *Silene spaldingii*, is within 300 feet of LJCRP units. All of the grassland species tend to grow in grassland between stringers of forest.

Potential direct effects to *Calochortus macrocarpus v. maculosus* include crushing by logging machinery and piling, as well as soil disturbance from the same. Indirect effects could be negative in the case of spreading invasive annual grasses and noxious weeds through ground disturbance and prescribed fire. Positive indirect effects could be the removal of conifers encroaching into grassland stringers and nitrogen release as a result of prescribed burning.

Potential indirect effects of road construction include increased vehicle use on the new road and adjacent areas, increases in invasive plants, and changes in water movement

across the landscape. Road decommissioning and building is planned across limited areas in these habitat types. Project design criteria require areas with high potential habitat for sensitive plants may be surveyed for rare plants before project implementation. Direct and indirect effects to grasslands May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH).

The following table shows the locations of known sites of green-band mariposa lily (Calochortus macrocarpus v. maculosus in relation to areas where commercial thinning will occur. Both treatment units 52A and 29 are in inventoried roadless areas (IRAs), meaning that Alternative 2 silvicultural treatments could impact these TES sites, but Alternative 3 silvicultural treatments would not impact these sites. Both units are listed in the "high" category for prescribed fire, meaning prescribed fire is a high priority for these units under both alternatives.

FS Site ID	Species	Unit
0616020102	Calochortus macrocarpus v. maculosus	29
0616020106	Calochortus macrocarpus v. maculosus	52A

Special Habitats

HCNRA Rare Combinations of Outstanding and Diverse Ecosystems Mountain Big Sagebrush/Idaho Fescue plant association is considered with grassland habitats. This plant community is not found on the extreme eastern edge of LJCRP. It is not documented within any treatment units, but it is close to the 4680 road system. Very frequent fire suppresses mountain big sagebrush establishment, while long fire return intervals promote tree invasion into mountain big sagebrush communities. Fire return intervals of about 20 years are thought to be beneficial to mountain big sagebrush (Johnson, K. 2000). Suggested mitigation is to avoid activities associated with mechanical treatments in this community. Prescribed fire should implemented, although grasslands are low priority for prescribed fire in both alternatives.

Lithosols

There are three sensitive plants documented from lithosol habitats: Wallowa Ricegrass *(Achnatherum wallowaensis*), Snake River daisy (*Erigeron disparipilus)*, and Davis fleabane (*Erigeron engelmannii v. davisii)*. During the course of the 2014 TES plant surveys many new populations of Wallowa ricegrass and white fleabanes were discovered, as well as extensions of previously documented populations. The white fleabanes found in 2014 have not yet been identified to species and were all tentatively lumped into Davis fleabane. Most of the new Wallowa ricegrass sites are extensions of existing sites. Wallowa ricegrass is found south of Coyote Campground in LJCRP. In general the white fleabanes are found north of Coyote Campground, with the largest concentrations in the Cold Spring Ridge vicinity and Wildhorse Ridge. Alternative 2 will have the most activities near Lithosol habitat, although the activity areas in Alternative 3 are still substantial. Direct effects to TES plants found on lithosols are crushing plants with machinery, burying plants during grading, landing construction, damaging plants during felling and yarding, and burying plants under slash piles. Indirect effects are soil compaction and spread of noxious weeds and invasive annual grasses (Brooks 2009,

Dewey 2013). Mitigations: Known populations will be flagged prior to road grading and other road improvements, designation of parking areas and landings, with work overseen by District Botanist. In addition equipment operators will receive maps with known sites and instructions to avoid flagged areas. With mitigations both alternatives May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH) in Lithosols in LJCRP.

The following tables summarize the locations of lithosols with Wallowa ricegrass and the white fleabanes. The x's show what type of logging system could impact each known TES site listed. For example, for Achnatherum wallawaensis site 616020255, both ground based logging and skyline logging systems are planned for both Alternative 2 and Alternative 3. In the case of Erigeron disparipilus site 616042401, thinning is planned under Alternative 2, but not Alternative 3.

Known Sites (FS_Site_ID)	Alternatives 2 and 3				
	Ground	**Helicopter**	**Skyline**	**Thin**	**Roads**
Achnatherum wallowaensis					
616020255	x		x		
616020257	x		x		
616020500		x			
616020501		x	x		
616020502			x		
616020504	x				
616020505					temp rd off 460500
616020506	x	x	x		4600340
Erigeron disparipilus					
616042401				x (Alt 3 No Tx)	
Erigeron engelmannii var. davisii					
616020243	x		x		
616020244	x				
616020247	x		x		
616021354			x		
616042086	x	x	x (Alt 3 no tx)	x	4680, 4680219, 4680220

The following table shows new TES plant sites in Lithosol habitats that could be affected by logging operations. As with the table above, x's show the logging system planned for use in the location of the TES site. In this case there are no TES site numbers, unit numbers are used to indicate where the new site is located.

New Sites (Unit Numbers)	Alternatives 2 and 3			
	Ground	**Helicopter**	**Skyline**	**Thin**
Achnatherum wallowaensis				
120			x(no tx in Alt 3	
121		x	x	
205			x	
206			x	
Erigeron englemannii v. davisii				

5	x			
9			x(no tx in Alt 3)	
12		x		
13		x(no tx in Alt 3)		
16	x(no tx in Alt 3)			
18	x			
24	x	x	x	
110	x	x	x	
148		x		
1074				x(no tx in Alt 3)
1134				x(no tx in Alt 3)
1136				x(no tx in Alt 3)
1137				x(no tx in Alt 3)
1139				x(no tx in Alt 3

Special habitats

Within this habitat type HCNRA ***Rare Combinations of Outstanding and Diverse Ecosystems Douglas' Buckwheat-Sandberg's Bluegrass Plant Community Type*** is included. Recommended mitigations are the same as for TES plants in lithosols/shallow soils.

Rock Outcrops, Talus, Scree

Thinning activities such as felling or yarding near forested rock outcrops could kill plants living there. Prescribed fire generally does not burn in this habitat type, due to the low fuel levels. The main activity that may impact this habitat type is rock quarrying, or road construction. The removal of rocks through quarrying or road construction could directly kill plants by excavating them. Quarrying may potentially indirectly impact this habitat by exposing roots of plants that are not directly removed.

Project design criteria that protect "special" and sensitive plant habitat would provide a high level of protection to these habitats. Because the project design criteria would protect cliffs, rock outcrops, and talus in the project planning area, the implementation of Alternative 2 or Alternative 3 should have No Impact (NI) to cliffs, rock outcrops, and talus habitats, or to any sensitive species that may occur there.

Moist Meadows, Wet Meadows, Riparian, Springs and Seeps:

There are no documented species from moist meadows, wet meadows, riparian areas or springs and seeps. For Alternative 3, riparian areas and other moist to wet habitats are protected by INFISH buffers. Along Category 1 and 2 streams, a minimum 100 foot buffer would be maintained. The only treatments within a Category 1 RHCA is in Swamp Creek, as part of Alternative 2, where lodgepole will be thinned. Category 4 RHCAs

(intermittent streams) will be treated in alternative 2, and there will be a 25 foot variable width no harvest and no equipment buffer established during implementation by a hydrologist or fisheries biologist. Seeps and springs will be protected from logging and thinning activities with project design criteria. Direct and indirect effects are unlikely in these habitats.

Within this habitat type HCNRA ***Rare Combinations of Outstanding and Diverse Ecosystems Quaking Aspen Plant Community Types*** are included, although quaking aspen are not documented from the HCNRA portion of LJCRP, they are found within the project area and are considered as important for conservation within the Blue Mountain Ecoregion. Aspen can occur in meadows and meadow margins as well as in mixed conifer forest associated with shallow water tables. Aspen can benefit greatly from prescribed fire, if they are protected from ungulate use in seedling and sapling stages of growth. If Aspen are found in meadow or forest habitats, suggested mitigations are to treat areas by thinning conifers, or removing conifer encroachment from meadows and using prescribed fire. In addition, fencing may be required until aspen regeneration has developed enough to withstand ungulate use.

Comparison of Alternatives 2 and 3

Alternative 3 would be similar to Alternative 2, except there would not be commercial thinning in RHCAs, IRAs, and MA15. No trees greater than 21" would be harvested, except for safety or administrative reasons. Alternative 2 would treat about 22% of the project area while Alternative 3 would treat about 13% of the project area. Silvicultural treatments would be expected have less impacts under Alternative 3 than under Alternative 2.

PACFISH buffers would be followed where category 4 RHCAs are present within commercial units. Non-commercial thinning could occur in category 4 RHCAs as per the Blue Mountains Project Design Criteria (PDCs). The potential impacts to riparian dependent communities would be less for Alternative 3 than for Alternative 2, due to the fact there would only be 749 acres of non-commercial thinning in RHCAs.

Prescribed fire would differ in only in activity fuels burned associated with units treated. Alternative 3 would have less acres burned as a result of less units treated.

The road network would meet public access needs identified by Wallowa County, meaning more roads would be left open for passenger vehicle use in Alternative 3. However, the impact of roads to TES species under Alternative 3, would be no greater than it is under the existing condition. Under both Alternative 2 and Alternative 3, all roads considered for closure would remain open to ATV use. There would be slightly less miles of roads used for haul routes under Alternative 3 (about 1.5% less miles) and temporary roads would be the same for both Alternatives.

Both Alternative 2 and Alternative 3 would buffer all known populations of sensitive plants from ground disturbing activities, and a botanist would be consulted if any of the areas where the populations occur are within prescribed burn areas. As with Alternative 2, there may be impacts to individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH) in forested habitats, grasslands, and lithosol/rigid sagebrush/shallow soils habitats. In other

habitats considered, where there are no documented species and protection of TES habitats through policies and mitigations, and where disturbance is not expected, Alternative 3 would be expected to have No Impact (NI) on TES habitat or species.

Direct and Indirect Effects to Federally Listed, Proposed and Candidate Plants

Cumulative Effects

Weed EIS, 2670, prescribed fire, wildfire, plantations, thinning, grazing, roads, climate change

Since 1990, protection and management of sensitive species and their habitats (in the form of project design criteria, avoidance, or other mitigation) have been included in the design of all projects following Forest standards and guides in the Wallowa-Whitman National Forest Land and Resource Management Plan; and in direction and policy set forth in the FSM 2670. This has, and will continue to, reduce the potential of cumulative effects to sensitive plant populations and habitats.

Prescribed fire, thinning, grazing are activities that have occurred and will likely occur in the foreseeable future. Wildfire is an essential natural disturbance within the Lower Joseph Watershed, as well as the adjacent canyonlands of Hells Canyon and the Grand Ronde drainages. Many fires have spilled into Lower Joseph Watershed from Hells Canyon. Wildfire has both positive and negative results, depending on weather, climate, and site conditions. In my experience the most resource damage related to wildfire has been during suppression efforts when back burns are employed and have escaped, or special habitats are inadvertently included in back burns causing irreparable damage. Other fire suppression activities such as fire line construction are also potential causes of irreparable resource damage. It is unusual for wildfires to completely consume entire landscapes. It is typical for wildfire to vary in intensity, frequently skipping some areas, while incinerating other areas within the fire perimeter. Prescribed fire tends to be more uniform and applied at regular intervals. A downside of prescribed fire is that areas that are easy to burn, those with easy access and fairly simple topography are burned more frequently that areas that have difficult access and more complex topography. Easy access along roads combined with prescribed fire can result in increases in noxious weeds and non-native grasses.

Silvicultural treatments are part of the landscape. Lower Joseph Watershed has x acres of plantations. Within the plantations are old skid trails that provide access to wildlife and cattle inside otherwise dense stands of trees.

Grazing in most likely to complicate restoration efforts, especially in dry open forest habitats, where palatable browse and grass is most accessible. Pasture condition should be assessed by the district range specialist and the district botanist after restoration treatments occur and prior to putting livestock out to graze. Premature use of treated pastures can lead to increased bare soil, erosion, decreases in native bunchgrasses and increases in invasive annual grasses.

Moist and wet meadows, riparian areas, springs and seeps may be more exposed after logging, thinning and/or prescribed fire, making them more vulnerable to use by both wild and domestic ungulates. Many of the springs in the project area have been converted to ponds, or diverted to troughs, locally drying soil and making water less available to

vegetation. Lithosols are subject to off-road vehicle use, livestock use, as well as parking areas, and sites for piling and yarding.

Cumulative effects for alternative 3 would be the similar to Alternative 2 cumulative effects. Alternative 3 would have no treatments in MA15, IRAs or PWAs, so less acres would receive silvicultural treatments. Less roads would be closed, leaving more access for passenger vehicles, but there would be no change in off road travel between current conditions or Alternative 2.

Resource Indicator and Measures

- HRV: Restoration activities in LJCRP will move dry forests toward acceptable range of variability, benefitting understory plants that grow in open forest. Grassland species growing in dry forest margins may benefit from some tree removal if PDCs are followed. Species requiring a moist microclimate would persist, if PDCs are followed.
- Viability:

From Powell 2013: The principles of forest sustainability, and international commitments to biodiversity, mean that it is important to provide for viable populations of all species. But we can't even identify all forest-dependent species (when considering non-vascular plants, fungi, arthropods, unicellular organisms, etc.); we can't possibly develop hundreds of species-specific habitat management plans (the 'fine filter' approach for species at risk of becoming extirpated or endangered), and policies promoting any one species typically have negative effects on others (Cumming et al. 1994). So the prudent strategy is to maintain the composition, age-class distribution, landscape pattern, and stand-level structures under which indigenous species have persisted through history.

- Diversity: Maintaining high diversity appears to require episodic random disturbance. Very stable regionally extensive and homogenous communities may have lower diversity than communities that are a mosaic of patches created by disturbance such as fire, disease, and windthrow. After disturbance diversity increases with time up to a point where a few large, long lived species prevail and dominate the system and diversity decreases (Barbour 1987).

From Powell 2013: The intermediate disturbance hypothesis (IDH) suggests that biodiversity and ecosystem function are higher in moderately disturbed habitats when compared with either of the extremes (low and high disturbance levels), resulting in a bell-shaped curve when biodiversity is related to disturbance severity (Biswas and Mallik 2010). IDH postulates that species richness is maximized by intermediate levels of disturbance – theoretically, they allow both early- and late-successional species to coexist. If disturbance is rare, then competitive exclusion results in domination by late-seral species; if disturbance is frequent, early-seral species predominate. But in either case, the result is the same – less species diversity than would be expected for intermediate disturbance levels (Kuuluvainen and Grenfell 2012).

Studies examining secondary succession also found that plant diversity was consistently higher in forest stands managed using silvicultural treatments when compared with unmanaged reserves, and species richness was positively correlated with the amount of

overstory canopy removed (high for clearcuts and shelterwoods; low for individual-tree selection) (Battles et al. 2001). As a result, the frequency and intensity of disturbance (including activities designed to emulate disturbance processes) is often linked to species diversity (Connell and Slatyer 1977, Huston 1979).

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The purpose and need for action is consistent with the 1990 Wallowa-Whitman National Forest Land and Resource Management Plan, as amended (Forest Plan). It is supported by differences between existing and desired ecosystem conditions, as determined from the Forest Plan, local policy recommendations for desired ranges of variation in vegetation conditions, local landscape assessments (e.g., Lower Joseph Creek Watershed Assessment (2013)), collaboration with the Wallowa-Whitman Forest Collaborative and other publics, other agencies, consultation with Tribes, and field reviews. The purpose and need is also driven by goals of the National Cohesive Wildland Fire Management Strategy (2011), particularly goals to restore and maintain landscape resiliency to fire-related disturbances, and reduce risk of wildfire to human communities and infrastructure. The purpose and need is also consistent with the Endangered Species Act for the protection and restoration of Snake River steelhead as well as the Clean Water Act for protection of water quality and waterways in the project area.

Sensitive plants were not identified as a key issue for analysis for this project. Therefore, no quantitative measures were developed relative to sensitive plants. The biological evaluation (BE) process is the qualitative analysis that was used to analyze potential effects to rare plants. The BE process is the method used to achieve Wallowa-Whitman National Forest Plan goals and objectives for protection of sensitive plants. The BE process was completed by a professional botanist for this project.

Potential impacts to sensitive plant populations and potential habitat were addressed through the interdisciplinary team, NEPA, and BE processes during project planning. All proposed project activities are therefore consistent with the above listed laws, Forest Service regulations, and applicable Wallowa-Whitman National Forest Plan standards, as they apply to botany.

Although there is a small chance of negative impacts to sensitive plant species from either action alternative selected (MIIH), the potential of negative impacts is relatively small. The areas treated are a relatively small percentage of the known populations and potential habitat for sensitive plants species throughout their range. Therefore, although the project may impact individuals and habitats for some sensitive plant species, implementation of either action alternative should not result in a contribution towards a trend toward federal listing of any sensitive plant species. The selection of either action alternative should not lead to a reduction in the long-term viability of any sensitive plant species on the Wallowa-Whitman National Forest.

Monitoring Recommendations

Project design criteria should provide sufficient protection to known sensitive plant populations and potential habitat in the project planning area. However, implementation monitoring is recommended for some sensitive plant populations for this project. This would include site visits to populations during and after project implementation. This would insure documentation that project design criteria were implemented. It would also allow an opportunity to confirm that the assumptions used for development of the project design criteria are correct. For example, a revisit to areas buffered a certain distance from activities would confirm is the distance is sufficient to prevent blow down, or unacceptable changes in hydrology or sunlight.

Appendix 1: Sensitive Plant Occurrence and Effects Calls

Scientific Name	Common Name	Presence in planning area[1]	Effects Calls[2] Alternative 2 and 3
Fungi			
Rhizopogon subclavitisporus	truffle	S	MIIH
Rhizopogon bacillisporus	truffle	S	MIIH
Lichen			
Thelnella muscorum v. octospora	eight-spored moss crust	S	MIIH
Liverwort			
Ptilidium pulcherrimum	naugahyde liverwort	S	MIIH
Moss			
Anomobryum filiforme	common silver moss	S	NI
Buxbaumia aphylla	Bug on a stick	S	MIIH
Encalypta brevipes	candle snuffer moss	S	NI
Entosthodon fascicularis	banded cord moss,	S	MIIH
Schistostega pennata	goblin's gold	S	MIIH
Splachnum ampullaceum	purple-vased stink moss	S	MIIH
Tetraphis geniculata	bent stem moss	S	MIIH
Tortula mucronifolia	sharp tipped twisted moss	S	MIIH
Vascular Plants			
Achnatherum wallowaense	**Wallowa ricegrass**	**D**	**MIIH**
Allium geyeri v. geyeri	Geyer's onion	S	MIIH
Arabis hastatula	Hells Cayon rockcress	S	NI
Botrychium crenulatum	crenulate moonwort	S	MIIH
Botrychium hesperium	western moonwort	S	MIIH
Botrychium lunaria	common moonwort	S	MIIH
Botrychium montanum	mountain moonwort	S	MIIH
Botrychium pedunculosum	stalked moonwort	S	MIIH
Calochortus macrocarpus* v. *maculosus	**green-band mariposa lily**	**D**	**MIIH**
Carex cordillerana	cordilleran sedge	S	MIIH
Carex duriuscula	needleleaf sedge	S	MIIH
Cypripedium fasciculatum	clustered lady's slipper	S	MIIH
Delphinium bicolor	flathead larkspur	S	MIIH
Eleocharis bolanderi	bolander's spikerush	S	MIIH
Erigeron disparipilus	**Snake River daisy**	**D**	**MIIH**
Erigeron englemannii v. davisii	**Davis fleabane**	**D**	**MIIH**
Isoetes minima	midget quillwort	S	MIIH
Listera borealis	northern twayblade	S	MIIH
Mimulus hymenophyllus	membrane-leaved monkeyflower	S	MIIH
Muhlenbergia minutissima	annual dropseed	S	MIIH
Phacelia minutissima	dwarf or least phacelia	S	MIIH
Phlox multiflora	many-flowered phlox	S	NI
Pleuropogon oregonus	Oregon semaphore grass	S	MIIH
Pyrrocoma scaberula	**rough rabbit weed**	**D**	**MIIH**
Rorippa columbiae	Columbia cress	S	MIIH
Rotala ramosior	lowland toothcup	S	MIIH
*Silene spaldingii**	Spalding's catchfly	S	MIIH

Scientific Name	Common Name	Presence in planning area[1]	Effects Calls[2] Alternative 2 and 3
Suksdorfia violacea	violet mock brookfoam	S	NI
Trifolium douglasii	Douglas' clover	S	MIIH

[1]Project Planning Area Occurrence

Documented	D	Species is documented in the project planning area
Suspected	S	Potential habitat present, and species is suspected to occur in project planning area

[2]Effects Calls

NI	No impact, the species does not occur in project area, and/or activities will not impact populations
MIIH	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species
WIFV	Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of Viability to the Population or Species
BI	Beneficial Impact

*****USFWS Listed Endangered Species

Appendix 2: Sensitive Plants documented or suspected to occur in the LJCRP by habitat type.

Habitat Group	Species	Status[1]	Global rank[2]	State rank[3]	Common name
Coniferous forest	*Buxbaumia aphylla*	S	G4G5	S2	bug on a Stick Moss
	Carex cordillerana	S	G3G4	S2	cordilleran sedge
	Cypripedium fasciculatum	S	G4	S2	clustered lady's slipper
	Listera borealis	S	G4	S1	northern twayblade
	Ptilidium pulcherrimum	S	G5	S1	naugehyde liverwort
	Rhizogogon subclavitisporus	S	G2G3	S1	truffle
	Rhizopogon bacillisporus	S	G2G3	S1	truffle
	Schistostega pennata	S	G3G4	S2	goblin's gold (moss)
	Tetraphis geniculata	S	G3G5	S1	bent stem moss
Grassland	***Calochortus macrocarpus v. maculosus***	D	G5	S2	green-band mariposa lily (Nez Perce mariposa lily)
	Pyrrocoma scaberula	D	G3	S2	rough rabbit weed
	Carex duriuscula	S	G5	SH	needleleaf sedge
	Delphinium bicolor	S	G4G5	S1	flathead larkspur
	Silene spaldingii[4]	S	G2	S1	Spalding's catchfly
Moist meadow	*Allium geyeri v. geyeri*	S	G4G5	S1	Geyer's onion
	Botrychium crenulatum	S	G3	S2	crenulate moonwort
	Botrychium hesperium	S	G4	S1	western moonwort
	Botrychium lunaria	S	G5	S2	common moonwort
	Botrychium pedunculosum	S	G2G3	S1	stalked moonwort
	Phacelia minutissima	S	G3	S1	dwarf phacelia
	Trifolium douglasii	S	G2	S1	Douglas' clover
	Muhlenbergia minutissima	S	G5	S2	annual dropseed
Rock outcrops, talus, scree	*Arabis hastatula*	S	G2	S2	Hell's Canyon rockcress
	Anomobryum filiforme	S	G4G5	S1	common silver moss
	Encalypta brevipes	S	G3	S1	candle-snuffer moss
	Mimulus hymenophyllus	S	G1	S1	membrane-leaved monkey flower
	Suksdorfia violacea	S	G4	S1	violet mock brookfoam
	Tortula mucronifera	S	G5	S2	sharp tipped twisted moss
	Phlox multiflora	S	G4	S1	many-flowered phlox
Lithosols	***Achnatherum***	D	G2G3	S2S3	Wallowa ricegrass

	wallowaensis				
	Erigeron disparipilus	D	G5	S2	Snake River daisy
	Erigeron englemannii v. davisii	D	G3G4	S2	Davis fleabane
	Thelenella muscorum v. octospora	S	G4G5	S2	eight-spored moss crust
Springs and seeps	*Eleocharis bolanderi*	S	G4	S2	Bolander's spikerush
	Entosthodon fascicularis	S	G4G5	S1	banded cord moss
	Isoetes minima	S	G1G2	S1?	midget quillwort
Wet meadow/ riparian	*Botrychium montanum*	S	G3	S2	mountain grape-fern
	Pleuropogon oregonus	S	G1	S1	Oregon semaphoregrass
	Rorippa columbiae	S	G3	S3	Columbia cress
	Rotala ramosior	S	G5	S2	lowland toothcup
	Sphlachnum ampullaceum	S	G5	S1	purple-vased stink moss

1/ D = documented to occur in the project area; S = suspected to occur in the project area

2,3/ 1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation. 2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation). 3 = Rare, uncommon or threatened, but not immediately imperiled. 4 = Not rare and apparently secure, but with cause for long-term concern. 5 = Demonstrably widespread, abundant, and secure. H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered.

4/ Federally listed threatened

Appendix 3: Rare Combinations of Outstanding and Diverse Ecosystems and Parts of Ecosystems in HCNRA

Definition

Rare combinations of outstanding and diverse ecosystems and parts of ecosystems associated therewith are plant associations and plant community types that are biologically unique to the HCNRA or isolated within the HCNRA, but may be common elsewhere. The plant associations and plant community types that were chosen to represent rare combinations of outstanding and diverse ecosystems are botanically and ecologically unique within the HCNRA because they occur in the HCNRA and nowhere else or are in limited amounts within the HCNRA.

Determination

For the HCNRA, these plant associations and community types are classified and described in *Plant Associations of the Wallowa-Snake Province* (Johnson and Simon 1987). From among these, the Region 6 Area 3 plant ecologist, Charles G. Johnson, selected those plant communities and plant associations in the HCNRA that met the criteria for biologically unique, based on his extensive knowledge and professional experience of over 25 years of work classifying plant associations and communities, and monitoring sites to study the effect of disturbance factors (primarily fires, grazing, flood events, landslides) on plant succession. This selection of plant associations and community types was then compared to *intrinsically rare* habitat types that were identified in the ICBEMP *Analysis of Vascular Plants* (Croft et al 1997). Intrinsically rare habitat types are naturally restricted due to a unique set of environmental attributes as opposed to managed rare which is a result of human caused activities (Croft et al 1997). Many of the habitat types shown to be intrinsically rare in the ICBEMP study area do not occur in the HCNRA. Some of the plant associations and community types that were found to be biologically unique in the HCNRA also were identified as intrinsically rare in the *Analysis of Vascular Plants.* Refer to the following section for a complete description of rare combinations of outstanding and diverse ecosystems and parts of ecosystems in the HCNRA. Any potentially new rare combinations discovered would need to meet these criteria to be considered biologically unique under the *HCNRA Act*.

Description of Rare Combinations of Outstanding and Diverse Ecosystems
Documented from LJCRP area that is within the HCNRA:

Mountain Big Sagebrush/Idaho Fescue Plant Association

The mountain big sagebrush/Idaho fescue plant association is separated topographically into a steep slope type found at higher elevations in the Wallowa and Seven Devils Mountains and a gentle ridgetop type at moderate elevations across the dissected plateau tops of the HCNRA. ARTRV/FEID (seep, high) – In late seral stands Idaho fescue is the principal associate with mountain big sagebrush. With degradation, fescue declines while the following plants increase: mountain brome (BRCA), Hood's sedge (CAHO), Wyeth's buckwheat (ARHE), yarrow (ACMIL), and groundsel (SEIN). Heavy site deterioration results in dramatic increases by tailcup lupine (LUCA) and Wyeth's buckwheat (ERHE).

Past sheep grazing and use has eliminated many of these subalpine-montane sagebrush communities. In highly disturbed communities, Wyeth's buckwheat, mountain brome, yarrow, and golden buckwheat (ERFL) often replace the Idaho fescue. However, Hood's sedge tends to remain intact on moist concavities and deeper soil areas with Idaho fescue. This high elevation type occurs on shallow gravelly soils from 7,700 to 7,900 feet in elevation, and on southwesterly aspects. Slopes average 40 percent. Total herbaceous production from two sampled sites ranged from 200 to 600 lbs./acre (dry wt.). The occurrence of this shrub/bunchgrass community in the HCNRA is limited. Communities occur on the northern extremities of HCNRA where broad ridgetops consist of Columbia River basalts with loessal soils derived from the Columbia River basin. It is here that limited stands occur. Daubenmire (1970) recognized these stands as disjunct edaphic climax populations that are relict from a hypsithermal period when climates were more conducive for more widespread, contiguous stands in the area. Today's population is centered on Cold Springs Ridge in the Downey Saddle and Grasshopper Ridge vicinity north of the Frog Pond. A second area of occurrence in the HCNRA is in the Seven Devils Mountains. Here stands are restricted to southerly and westerly aspects on steep mountainous slopes at 8,000 feet. In the Blue and Wallowa Mountains outside the HCNRA this same plant association is commonly found. The unique character of these HCNRA communities occurs in their disjunct nature as outliers in the Seven Devils and on the southern edge of the Palouse Region.

Douglas' Buckwheat-Sandberg's Bluegrass Plant Community Type

Shallow soil ridgetop communities dominated by Douglas' buckwheat (ERDO) with Sandberg's bluegrass (POSA3) define this plant community type. Perennial forbs usually associated with these communities are stonecrops (SEST, SELA2), biscuitroots (LOLE, LOCO2), big-head clover (TRMA), lovely penstemon (PEEL), sticky phlox (PHVI3), Holboell's rockcress (ARHO), hoary balsamroot BAIN), and Snake River daisy (ERDI4). As with many buckwheat communities, the ERDO/POSA3 type may be a product of past soil loss resulting from overgrazing and subsequent soil and wind erosion. With disturbance, erosion pavement and bare ground increase with a marked decline in moss cover. Forbs tending to increase are pussytoes, biscuitroots, bighead cover, lovely penstemon, and sticky phlox. Shallow soil ridge top scablands dominated by Douglas' buckwheat with Sandberg's bluegrass define this plant community type. This plant community may be a product of past soil loss resulting from overgrazing and subsequent soil and wind erosion. The community is limited in extent and is located on Cold Springs Ridge. Although Daubenmire (1970) classified a Douglas' buckwheat-Sandbergs bluegrass habitat type in central Washington, its plant composition was significantly different. These communities in northern Wallowa County are restricted to broad ridges trending toward the Grande Ronde canyon. It appears to be restricted to higher bunchgrass ridge tops where higher precipitation is available. Since it is restricted to a few ridge tops in the HCNRA, it warrants listing as an outstanding and diverse ecosystem.

Ponderosa Pine/Idaho Fescue and Ponderosa Pine/Bluebunch Wheatgrass Plant Associations

Ponderosa pine totally dominates as the only tree species able to persist in the PIPO/FEID type. Shrubs are essentially absent, but common snowberry and rose do occur in limited amounts. Idaho fescue (FEID), bluebunch wheatgrass (AGSP), and prairie junegrass (KOCR), are the dominant understory species in the type. The most common forbs are lupine (LUPIN), and yarrow (ACMIL). The PIPO/AGSP community is very dry with trees occurring in a savannah over bluebunch wheatgrass-dominated steppe. Ponderosa pine totally dominates as the only tree species able to persist in the PIPO/AGSP type. Shrubs are absent except for occasional dry-site opportunists (serviceberry, mountain-mahogany, squaw currant). Bluebunch wheatgrass and pine bluegrass (POSC) dominate the understory with cheatgrass usually associated in areas where ungulates have churned the soil beneath the old-growth trees. Idaho fescue is absent as it is unable to persist on these drier sites. Yarrow and lupines are the only common forbs regularly associated. Both of these plant associations are uncommon in the HCNRA. Most of the ponderosa pine-dominated communities are successional to Douglas fir. These associations occur on substrates that are too harsh for fir potential. The Little Granite RNA was proposed in part to encompass known locations of these associations. Although ponderosa pine/bunchgrass communities with Idaho fescue and bluebunch wheatgrass potentials are found throughout the inland Pacific Northwest, sites which are too warm and too dry for fir establishment are limited in the HCNRA. Therefore, these restricted communities are worthy of being included as outstanding and diverse ecosystems to the NRA.

Description of Rare Combinations of Outstanding and Diverse Ecosystems
Not documented from LJCRP within the HCNRA:

Bluebunch Wheatgrass/Wyeth's Buckwheat Plant Association
This type characterizes the highest elevation extension of communities in the bluebunch wheatgrass series. It occurs in the Idaho fescue zone, but on soils having minor loess influence. The AGSP/ERHE type is dominated in late and mid seral stages by bluebunch wheatgrass and Wyeth's buckwheat (ERHE) on steep canyon slopes. Sandberg's bluegrass in largely replaced by two grasses not generally found in the other grassland vegetation of the HCNRA – pine bluegrass (POSC) and oniongrass (MEBU). This type has an appearance of bunchgrasses with buckwheat clumps and forb-free interspaces. Perennial forbs are few with yarrow (ACMIL), white-stemmed frasera (FRAL2), Blue Mountain penstemon (PEVE), and lupine (LUCA) most frequently encountered. Bare ground, gravel, and rock averaged almost 50 percent in late seral communities. This grassland plant association is restricted to the Lonesome Summit and North Pine Creek vicinity. Sites are confined to moderately-steep to steep, southeast-to-southwest facing inter-rims of convex to slightly undulating micro-relief at mid to upper third slope positions. Typical soils on which this association is found are skeletal with surface rock often exceeding 50 percent total cover. This plant association is unknown from other plants of the Pacific Northwest. A similar kind of community is known from the North Fork of the Clearwater in Idaho but has not been described or classified. Since it is endemic to the HCNRA in a relatively limited area, it is included in this listing of outstanding and diverse ecosystems.

Bitterbrush/Bluebunch Wheatgrass Plant Association

Bitterbrush occurs with bluebunch wheatgrass on canyon sites that are too low in elevation to support Idaho fescue in the extreme south-eastern flank of the Wallowa Mountains. Late seral stands are dominated by a bluebunch wheatgrass-bitterbrush savannah where bitterbrush covers 20 percent of the area. Associated are Sandberg's bluegrass, arrowleaf balsamroot, and fern-leaved lomatium (LODIE). Endemics to this type are shrubby bedstraw (GAMU) and bulbous bluegrass (POBU). With degradation, bluebunch wheatgrass declines, as bare ground and rock/gravel coverage increases. Increasing perennials are Sandberg's bluegrass, arrowleaf balsamroot and lomatiums (LOTR, LODIE). Bitterbrush occurs with bluebunch wheatgrass on canyon shrubland sites that are too low in elevation to support Idaho fescue in the extreme southeastern flank of the Wallowas. This association is limited in extent within the HCNRA but is common in the lower North Pine Creek vicinity. Site locations are usually rocky inter-rims at the mid to upper third of slopes, but occasionally are on ridge brows or lower slopes. Bitterbrush is found in the Wallowas at the upper limits of its ecological range and can maintain its upper elevation dominance on sites that are loess-free and with southerly aspects. Although this plant association is known from elsewhere in the Pacific Northwest, it represents a limited occurrence in HCNRA and is also rare in northeastern Oregon.

Buckwheat/Oregon Bladderpod Plant Association

The ERIOG/PHOR plant association is found as isolated small communities on limited and unique substrates. Two species of buckwheat (*Eriogonum strictum var. proliferum* and *Eriogonum microthecum*) populate hydrothermally altered basaltic outcroppings found sporadically in the lower Imnaha and Snake River Canyons where this type is restricted. These outcroppings are easily weathered and generally contain a talus cone. Spatial patterns develop between the associated plants. Plants demonstrating specific affinity to these sites are: desert evening primrose (OECA2), Oregon bladderpod (PHOR), western prairie-clover (PEOR4), fuzzy tongue penstemon (PEER), pallid milkweed ASCR), and hoary chaenactis (CHDO). Other species commonly found are: prickly pear (OPPO), bristly cyptantha (CRIN3), hairy golden-aster (CHVI2), varied-leaf phacelia (PHHE), hairy milkvetch (ASIN2), yarrow (ACMIL), bluebunch wheatgrass (AGSP), and cheatgrass (BRTE). This plant association is found as isolated small stands on limited and unique substrates. The type is restricted to hydrothermally altered basalt outcroppings found only in the lower Imnaha River and on ridges separating Horse, Lightening, and Cow Creeks (Vallier 1998). The substrate is one of shifting pea gravel on steep slopes with a high erosive potential. Since there is little to entice ungulates onto these sites, they retain an erosion pavement that helps the perennial plants establish. The association is interesting botanically with six species demonstrating an affinity to these plant associations. Since these sites are extremely limited in occurrence within the Snake-Imnaha canyon lands, this community warrants special recognition.

Sand Dropseed Plant Association

This type is characterized by communities on the sandy river terraces and alluvial bars where sand dropseed (SPCR) is considered climax. In these communities, sand dropseed dominates as the only perennial bunchgrass in mid seral stands. Cheatgrass (BRTE) and Japanese brome (BRJA) are usually always thyme leaf sandwort (ARSE), and filaree

(ERCI) are the most frequently encountered. Other plants that are restricted to warm, low elevation habitats often occurring with sand dropseed are: moth mullein (VEBL), blazing star (MELA2), groundcherry (PHLO2), and white-stemmed globemallow (SPMU). Early seral sand dropseed communities are usually invaded by red three awn (ARLO3), goatweed (HYPE), and prickly pear (OPPO) with reduced dropseed coverage. Annual brome coverage is nearly double that of mid-seral communities. Annual forbs that are most commonly associated include thyme leaf sandwort (ARSE), blue forgetme- not (MYMI), filaree (ERCI), and small flowered crane's bill (gepu). Bare ground, rock, and gravel exposure increase with disturbance. Moss coverage declines with the site degradation. This association is characterized by communities on the sandy river terraces and alluvial bars where sand dropseed is considered climax. The species is native within these specific locations and at the northern extent of its range ecologically. Bill's Creek Research Natural Area (RNA) was proposed to highlight a particularly homogeneous community of sand dropseed in a setting where the species is believed to have initiated its increase in the Snake River canyons. This community is also found on those native bunchgrass sites (i.e., bluebunch wheatgrass) where early spring grazing had damaged the bluebunch wheatgrass (a cool season species) and favored the invasion or increase in sand dropseed (a warm season species). The species is more commonly found in the desert southwest and Great Plains. It reaches its northern extension in the Pacific Northwest in the Snake River canyon. Since sites supporting sand dropseed communities on river terraces, alluvial fans, and sandbars are relatively limited, the sand dropseed communities that are considered potential natural vegetation along the river corridor merit special recognition.

Wallowa Lewisia Rim Plant Community Type

The Wallowa bitterroot or lewisia sporadically occupies the upper canyon rims and ridge brows of the Snake River Canyon and adjacent canyons in Oregon. It is prolific on stable, rocky walls and peaks of the Seven Devils. Lewisia co-exists with shrubby penstemon (PEFRS) on the rim tops. Sandberg's bluegrass (POSA3), onespike oatgrass (DUAN), stonecrop (SELA2), and scabland fleabane (ERBL) are typical scabland associates while bluebunch wheatgrass and Idaho fescue occur as opportunists from adjacent FEID-KOCR grasslands. Other prominent plants associated are yarrow (ASCMIL), hoary balsamroot (BAIN), Cous biscuitroot (LOCO2), and Blue Mountain penstemon (PEVE). As adjacent deeper-soil bunchgrass sites are overgrazed, lewisia may invade from its rocky habitat. The stands sampled all occurred at ridgetop or ridgebrow locations in Oregon (Grizzly, Morgan, Jackey, and Deadhorse Ridges). Elevations ranged from 5,000 to 6,500 feet on these sites. The species also clings to rim palisade walls. Other observed communities of lewisia in the Seven Devils ranged from 6,000 to 9,000 feet where the species appeared to be more common as either a reflection of substrate affinities, cooler-moister condition, or by virtue of its geographical setting closer to the center of its range. The Wallowa bitterroot (lewisia) sporadically occupies the upper canyon rims and ridge brows of the Snake River Canyon. It is prolific on stable, rocky walls and peaks of the Seven Devils. These communities occupy a narrow ecological niche in a very restricted area within the HCNRA. The Wallowa bitterroot is good representative of a showy endemic in the HCNRA.

Subalpine Fir/Fool's Huckleberry Plant Association (not known from LJCRP)
This moist site community is dominated by an Engelmann spruce overstory on steep, north slopes and gentle benches where moisture is retained throughout the summer drought period. Subalpine fir is often codominant in the overstory, but always dominates the reproduction in the understory layer. Lodgepole pine is a frequent overstory component as a decadent old-growth member. Fool's huckleberry (MEFE), a tall shrub, dominates the undergrowth (mean cover: 63 percent) with true huckleberries (VAME, VASC) always associated beneath fool's huckleberry. Sitka alder is often present on these mesic sites. The shrub cover is so dense that other plants are often unable to compete and persist. Only rattlesnake plantain (GOOB), sidebells pyrola (PYSE) and prince's pine (CHUM) are frequently found occurring beneath the shrubbery. This association is restricted to mesic, cold site locations at higher elevations in the Seven Devils and above the head of Lightning Creek north of Memaloose. Although fool's huckleberry is abundant in the northern Rockies, it barely reaches the forests of the Snake River Canyon separating Oregon and Idaho. Due to its rare occurrence in the HCNRA it warrants listing as an outstanding and diverse ecosystem.

Quaking Aspen Plant Community Type
Quaking aspen communities are rare in the HCNRA, and occur in relatively small, scattered clones. Their presence is generally associated with meadows or areas within conifer stands where subsurface moisture is present throughout most of the growing season. Grassland management, forested vegetation management, and fire can all influence the propagation and survival of aspen communities. Quaking aspen stands are infrequent in the Wallowa-Snake Province. Clones are generally limited to fringes around meadows or as islands in ridge top grasslands where subsurface moisture is available throughout most of the growing season. Cattle and big game generally favor these stands. Mature stands are generally in decadent condition because of old age, disease, overshading, crowding from encroaching conifers, and a general lack of vegetative reproduction due to browsing of root sprouts by ungulate wildlife species and domestic livestock. Aspen is an early-seral, pioneer species that is propagated by root suckering after disturbances like fire or removal of mature stems. Maturation of root sprouts to older age classes most often requires some protection from grazing ungulates. Due to the relatively limited extent of occurrence, quaking aspen community types warrant being included as outstanding and diverse ecosystems to the HCNRA.

Netleaf Hackberry/Bluebunch Wheatgrass Plant Association
The hackberry communities of the Wallowa-Snake Province are generally found at lower slope positions in deep canyons, occupying river terraces, and along riparian margins. Bluebunch wheatgrass is commonly associated as are annual bromes. Cheatgrass (BRTE), cleavers (GAAP), shading animals have disturbed the ground. Common associated tend to be some of the most drought-tolerant plants of the canyon lands (i.e., hairy golden aster (CHVI2) shaggy fleabane (ERPU), prickly pear (OPPO), and moth mullein (VEBL) Poison ivy (RHRA) occurs frequently with this community where it can tap deep moisture reserves. In more disturbed communities, skullcap (SCAN), yarrow (ACMIL), cheatgrass (BRTE), and common yellow sweet clover (MEOF) may form weedy patches.

Giant Wildrye Plant Community Type

Giant wildrye occurs at lower elevations along riparian stream courses on colluvial or alluvial terraces. These stands are usually very dense with wildrye often dominating to the exclusion of other plants. Miner's lettuce (MOPE) is always associated. Disturbance of stands show weediness by cleavers (GAAP), white top (*Cardaria sp*.), and annual bromes. Wildrye sites are usually gently sloping and below 3,000 foot elevation in canyon bottoms. They occur as riparian stringers or patches at toe of slope positions on deep, fine-textured soils. Many giant wildrye sites in the Snake River Canyon and its tributary canyons have been overgrazed resulting in the presence of only relic clumps of the species. These giant wildrye bottoms were once much more extensive in the canyon land bottoms. Heavy overgrazing by sheep as well as intensive haying of the native stands has reduced them to relict status in many places. Giant wildrye was extensively cut for hay in the early settlement days. Giant wildrye is very susceptible to grazing and mowing below eight inches. Cattle grazing in the winter often prefer this species following softening of its harsh herbage from fall and winter storms. In many canyon bottoms, the most preferred grass species (i.e., bluebunch wheatgrass of Idaho fescue) were lost to overgrazing resulting in greater dependence on once abundant giant wildrye stands. In these situations, the succulent new spring growth of giant wildrye may have been more highly sought after by livestock with injurious results for the plant. Giant wildrye plants can regularly be found at the base of talus slopes, on pit house sites and along fence rows. However, communities dominated by giant wildrye are scarce throughout Hells Canyon NRA. Past overgrazing has reduced stands of the grass to relict status. As the wildrye is overgrazed, annual plants invade and become prominent (i.e.- bedstraw *(Galium aparine)*, miners lettuce *(Montia perfoliata)* and annual bromes. The larger stands existing in Hells Canyon are small in comparison to those found today. Prior to Euro-American settlement and subsequent overgrazing by livestock, giant wildrye bottoms were much more extensive where drainages cross benchlands and river terraces. The most prominent stand of giant wildrye remaining in the HCNRA is located along Pleasant Valley Creek in the proposed Pleasant Valley Research Natural Area.

Spiny Green-bush/Bluebunch Wheatgrass Plant Association

The GLNE/AGSP type is found exclusively on rock outcrops and canyon rims and occurs as small isolated shrub groupings in a vegetation complex with bunchgrass communities. Spiny green-bush (GLNE) occupies the fractures of the rimrock with bluebunch wheatgrass (AGSP) occurring more commonly on deeper soil areas between rims. Bluebunch wheatrass, varileaf phacelia, and shaggy fleabane are generally present in late seral stages. Annual bromes (BRBR, BRTE) field chickweed, and yarrow, commonly occurs. Prickly pear is opportunistic on shallow soil sites of the rim rest while the whorled penstemon (PETR), occupies crevices of the rim face. Mosses are high in cover (mean: 19 percent) as is bedrock, rock, and gravel (mean: 50 percent). Spiny green-bush communities occupy steep slopes where rock outcrops dominate into an almost continuous palisade of bedrock. These are extremely harsh sites for plant growth. The leaves are inconspicuous as a strategy for survival. The HCNRA communities are confined to the Snake River Canyon at low elevations (2,000- 3,000 feet). The shrub occupies rock outcrop fractures that define its distribution across the slope. Bedrock

outcrops regularly above 25 percent and up to 40 percent. The hot, dry microenvironment limits perennial plants associated with the shrub. Bluebunch wheatgrass, whorled penstemon (*Penstemon triphyllus*) and shaggy fleabane (E*rigeron pumilus*) are the most common associates. The Alum Beds Research Natural Area (proposed) contains excellent stands of this association.

Curlleaf Mountain-Mahogany Plant Community Type

Bluebunch wheatgrass is the most commonly occurring plant beneath Snake River Canyon mountain-mahogany stands. Other common associates in late seral and mid degradation, bluebunch wheatgrass declines as annual bromes increase.

Three elevation levels were sampled where mountain-mahogany occurs. At the lower elevations (900-1,000 feet), the species was encountered only on toe slopes and river bar sites north of Mountain sheep Creek in association with netleaf hackberry and serviceberry. Snake River phlox and field chickweed occurred regularly with bluebunch wheatgrass beneath the shrubs. At mid-elevation (2,000-4,000 feet) the stands of mountain mahogany generally occurred on rim outcrops with an affinity for limestone. Here, spiny green-bush (GLNE) and Snake River phlox (PHCO2) were often associated. At the highest elevations (5,000-6,000 feet), mountain snowberry (SYOR), syringa (PHLE2), and oceanspray (HODI) often occurred with mountain-mahogany. On these more moist sites, Idaho fescue (FEID) and bluebunch wheatgrass (AGSP) were associated along with other fescue series members – Wyeth's buckwheat, arrowleaf balsamroot, and fern-leaved biscuitroot. Wyeth's buckwheat and elk sedge form mats on colluvial exposures at these higher elevations. Curlleaf mountain-mahogany is widespread in the southern Blue Mountains. However, it is extremely limited in occurrence in the HCNRA. Its distribution was found at three elevations in differing environmental and topographic settings. At upper elevations (5,000-6,000 feet) it is associated with mountain snowberry *(Symphoricarpos oreophilus),* Idaho fescue *(Festuca idahoensis)* and bluebunch wheatgrass. At mid-elevations (2,000-4,000 feet) it is found as a rim and outcrop community with an affinity for limestone. At the lowest elevations (900-1,000 feet) it can be sporadically found on river terraces and toe slopes north of Mountain Sheep Creek where it associates with hackberry *(Celtis reticulata)* and bluebunch wheatgrass. Stands are restricted to sites where outcroppings or talus provide sanctuary from fire mortality and where abundant vernal moisture is found deep in the fissures to sustain the shrub on these harsh, hot, dry outcroppings. The outcroppings of the Pittsburg Formation (Vallier 1974) occur on both sides of the Snake River Canyon from Wildhorse Butte to Grave Point in Idaho and from Pittsburg Creek to Pleasant Valley Creek in Oregon. This is one of the areas of greatest concentration for mountain-mahogany communities in HCNRA. The Pleasant Valley Research Natural Area (proposed) contains representative stands of this type on the Pittsburg Formation.

Slender Sedge Plant Community

This community has been found in only one location within the entire Blue Mountain province. It is located on a floating sphagnum bog on Duck Lake (which is within the proposed Duck Lake Research Natural Area). The next closest locations are on the east slopes of the Cascades. Growing within the community are other vascular plant

species that are also rare within HCNRA and the Blue Mountain province, mud sedge (*Carex limosa*), sundew (*Drosera anglica)*, Purple cinquefoil (*Potentilla palustris*), Northern mannagrass, *Glyceria borealis*, and bog buckbean (*Menyanthes trifoliata*). Twin Lakes and some other small nearby ponds also have *Drosera* and *Menynathes* and perhaps some of these other species.

Appendix 4: Botany Related Project Design Criteria

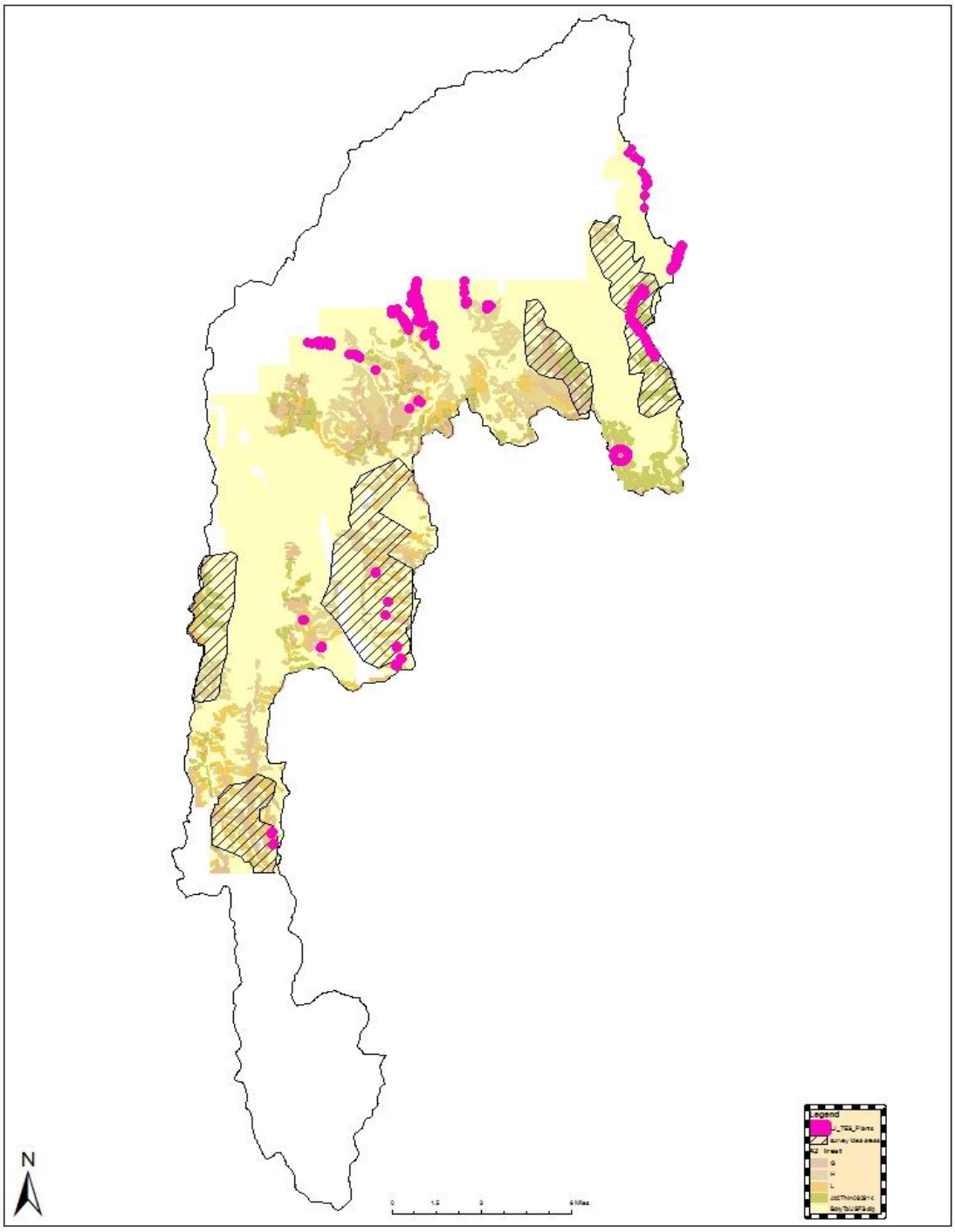
Edit this to match what has been worked out in the IDT process

Project Design Features and Mitigation Measures

- No road construction activities, parking, or piling on lithosols, grasslands, meadows.
- Seed disturbed areas according to USFS policy, and with approval of local botanist
- Avoid disturbing natural seeps and springs, wet meadows, moist meadows, this includes removing shrubs and trees.
- Leave tree islands in coniferous forest for conservation of native mycorhizal fungi, yew, wet areas.
- Maintain woody debris of all size classes to provide habitat for nonvascular plants and fungi
- Treat noxious weeds with approved methods as found, prior to logging activities.
- Avoid yarding over rock outcrops and talus slopes. Leave trees and shrubs adjacent to rock outcrops, talus as a microclimate buffer.
- Although some TES and Invasive plant surveys were conducted, searches were not specific to units on the ground, and clearance needs to be done prior to project activities. Known TES and INV plant populations will be flagged prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by District Botanist. In addition equipment operators will receive maps with known sites and instructions to avoid flagged areas.
- Do not use prescribed fire in areas with greater than 5 % cover of invasive annual grasses. Avoid putting fire through any sized patch of invasive annual grass.

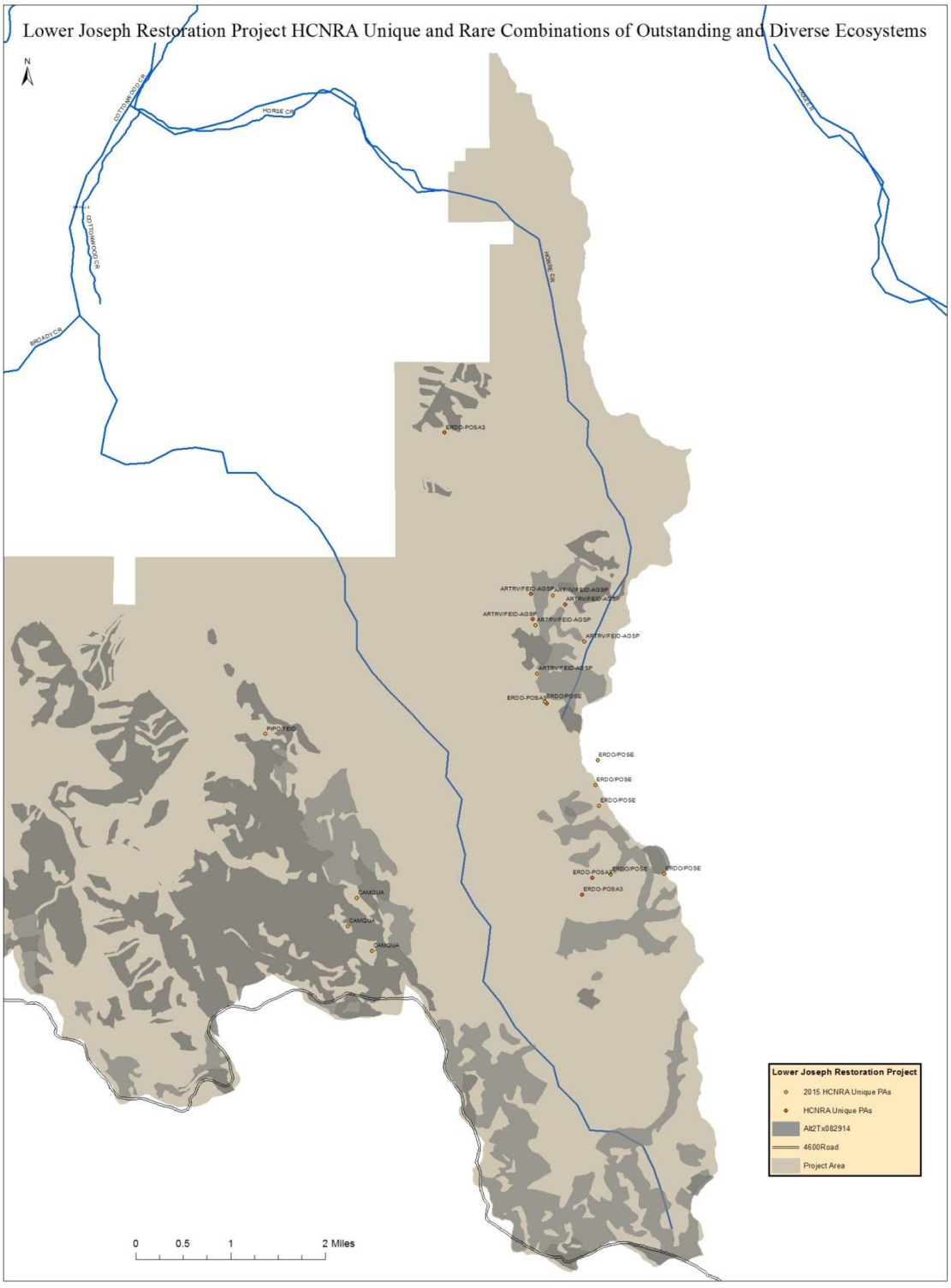
Appendix 5.

A. Areas surveyed for TES plants in 2015 are in black hatching. Pink dots represent TES plant locations. Yellow is the project area. Browns and greens are restoration units.



Appendix 5.

B. Locations of HCNRA Unique and Rare Combinations of Outstanding and Diverse Ecosystems in LJCRP. Orange dots are locations found in 2014. Red dots are locations documented by the Blue Mountain Ecology program.



Appendix 6: Summary of Effects

The United States Forest Service (USFS) biological evaluation (BE) process considers potential effects from the proposed project to federally listed, candidate, and proposed plant species. The BE process also evaluates potential impacts to USFS designated sensitive plants and sensitive plant habitat in the project planning area. USFS and United States Department of Interior, U.S. Fish and Wildlife Service (USDI-USFWS) records were consulted in order to determine which rare plant species and potential habitat may occur in the project planning area. Botany surveys for rare plants were conducted for this project. There are five Forest Service designated sensitive plant species documented in the project area: Wallowa ricegrass (*Achnatherum wallowaense*), green-band mariposa lily (*Calochortus macrocarpus* v. *maculosus*), snake river daisy (*Erigeron disparipilus*), Davis fleabane (*Erigeron englemannii v. davisii*), and rough rabbitweed (*Pyrrocoma scaberula*). Due to the large size of the project area, not all areas of potential disturbance were surveyed. There is a possibility that there are additional undiscovered populations of sensitive plants within the project planning area.

Potential direct, indirect, and cumulative effects to habitat types that support sensitive plants were analyzed. Recommendations to reduce the chance of detrimental impacts to sensitive plants and habitats are incorporated into the project as project design criteria. See the environmental consequences section of this report for details of the analysis and project design criteria. The following section summarizes the potential environmental consequences of this project.

Alternative 1 – No Action

Direct and Indirect Effects

Alternative 1, the No Action Alternative, does not propose any new activities. Therefore, if the No Action alternative is selected, there would be no new direct or indirect effects to sensitive plant species, or potential sensitive plant habitat. The overall call for the No Action alternative for all species of sensitive plants is No Impact.

Cumulative Effects

Because no management would occur, there would be no Proposed Action effects to add to ongoing or future actions that would contribute cumulative effects.

Alternative 2 – Proposed Action

Direct and Indirect Effects

There are no known populations of any federally listed, or proposed, plant species in the project planning area; however, there is potential habitat for the federally listed threatened plant, Spalding's catchfly (*Silene spaldingii*). There are proposed activities such as removing encroaching trees from grasslands and prescribed fire in potential habitat for Spalding's catchfly in the project planning area. Therefore, this project could have effects on Spalding's catchfly habitat. Therefore, consultation with the USFWS is necessary for plants for this project.

Activities in coniferous forests, grasslands, and riparian dependent communities may potentially directly and indirectly impact habitat, and undiscovered populations of sensitive plants. Potential detrimental direct impacts include the destruction of sensitive plants from ground disturbance associated with cutting of trees, yarding of trees, piling slash, or scattering slash. Prescribed fire or slash pile burning could scorch sensitive plant individuals within the fire area, and also may kill plants under and directly adjacent to slash piles. Fire line construction has the potential to directly kill or dislodge sensitive plants in the area that is denuded. Indirect effects could result from altering the hydrologic regime and changing light intensity. Vegetation management may also alter the interaction of herbivores and plants, including increased ingestion and trampling from ungulates. Positive effects of reducing forest canopy closure may be an increase in grass and forb cover, including a potential increase in TES plant species that require more open conditions.

Project design criteria would reduce the risk of detrimental impacts, but would not entirely eliminate the possibility of impacts to habitat and undiscovered populations in forested, grassland and riparian habitat types. None of the sensitive plant species that may occur in coniferous forest, grassland, and riparian dependent habitats on the Wallowa-Whitman National Forest are extremely rare on a global scale. Therefore, even if project activities may impact individual plants, populations, or habitat, implementation should not increase the need for Federal listing of any sensitive species.

The determination of effects for forested communities, grasslands, and riparian dependent habitats and associated sensitive plants, for Alternative 2 is: May impact individuals or habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to populations of sensitive plant species.

A number of TES plants grow in lithosols found within dry forest as well as areas adjacent to grasslands. Project design criteria would minimize ground disturbance in these special habitat areas, as well as HCNRA unique and rare combinations of outstanding and diverse plant associations found in LJCRP, and forest/grassland margins. Prescribed fire would be relatively low intensity in lithosols, sagebrush shrublands, grasslands, cliffs, rock outcrops, and talus. Therefore, there would be No Impact to the above listed special habitats and undocumented populations of sensitive plant species from activities associated with the proposed action.

PDCs and silvicultural prescriptions would help to protect and maintain habitat and populations of other plants of conservation concern, such as many culturally significant plants and unique and rare combinations of outstanding and diverse plant communities in HCNRA. Although there may be some short-term impacts to species and their habitats found within and adjacent to project activities, in the long term the proposed activities would improve overall habitat conditions by reducing the risk of uncharacteristic fire effects on the landscape.

Cumulative Effects

It is likely that historical activities, such as grazing, timber harvest, mining, road construction, and fire suppression have destroyed populations, and altered habitats for sensitive plants. These historical effects are not quantifiable. Climate change effects may be considered as a component of cumulative impacts. Changes in climate influence

vegetation, water, and disturbance frequencies, and these changes, in turn, influence one another. Attempts to quantify the degree of change would be speculative.

Since 1990, protection and management of sensitive species and their habitats (in the form of project design criteria, avoidance, or other mitigation) have been included in the design of all projects. This has, and would continue to, reduce the potential of cumulative effects to sensitive plant populations and habitats.

The potential for detrimental direct and indirect effects to these habitats from the proposed activities have been minimized through the use of project design criteria. There are no current plans to conduct vegetation management activities in this area beyond the scope of this project for the next 10 years. Therefore, implementation of the proposed action for this project, foreseeable future projects, and those that have occurred in the recent past, are not likely to contribute to any cumulative adverse impacts.

Alternative 3

Direct and Indirect Effects

Alternative 3 proposes very similar activities as Alternative 2. The main differences between Alternative 2 and Alternative 3 are related to the number of acres proposed for commercial thinning. The direct, indirect, and cumulative effects to sensitive plants and habitats are therefore very similar.

The same PDCs from Alternative 2 to protect sensitive plant populations and habitat would also be included for Alternative 3. These include protections and buffers for known sensitive plant populations in the project area. Therefore, the implementation of Alternative 3 would have No Impact (NI) to documented populations of sensitive plants in the project area.

Project design criteria would minimize ground disturbance in special habitat areas. Prescribed fire would be relatively low intensity in lithosols, sagebrush shrublands, grasslands, cliffs, rock outcrops, and talus. Therefore, there would be No Impact to the above listed special habitats and undocumented populations of sensitive plant species from activities associated with Alternative 3.

The potential impacts to forest and riparian dependent communities may be slightly less for Alternative 3 than for Alternative 2. This is mostly due to the fact that fewer acres are proposed for commercial treatment. Therefore, there would be fewer acres of ground disturbance, less change in canopy cover, and fewer acres of pile burning. This relatively minor difference is not enough to change the determination call for these habitats, and any sensitive plants that may occur there. Therefore, the determination of effects for forested communities, riparian dependent communities and any sensitive plants that may occur in those communities, for Alternative 3 is: may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to populations of sensitive plant species (MIIH) In the case of aspen enhancement, because the aspen stands would be rejuvenated and protected in the short-term from grazing; in the long term, there may be a Beneficial Impact (BI) to sensitive plant species in treated aspen stands from the proposed action alternative.

PDCs and silvicultural prescriptions would help to protect and maintain habitat and populations of other plants of conservation concern. These include culturally significant plants. Although there may be some short-term impacts to these species and their associated habitats, in the long

term the proposed activities would improve overall habitat conditions, and would enhance the productivity and health of the species.

Cumulative Effects

Cumulative effects for Alternative 3 would be the same as for Alternative 2. This is due to the fact that most activities and project design criteria are similar.

References

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